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ABSTRACT

Noting that many schools do not participate in the U.S. Department of Agriculture's School Breakfast Program despite evidence that poor nutrition affects children's school attendance and performance, this document presents the proceedings of a 1999 symposium on links between breakfast and school performance and the implications for public policy. The report includes opening remarks by the United States Department of Agriculture (USDA) Under Secretary for Food, Nutrition, and Consumer Services, the USDA Deputy Secretary of Agriculture, a U.S. senator from South Dakota, and the Acting Assistant Secretary from the Office of Elementary and Secondary Education of the Department of Education. The remainder of the report contains the presentations from the symposium. The scientific presentations are as follows: (1) "School Breakfast Program and Persistent Hunger in Children" (Ronald Kleinman); (2) "School Feeding and Educational Outcomes" (Ernesto Pollitt); (3) "The Effects of Breakfast on Children's Cognition, School Achievement, and Classroom Behavior" (Sally Grantham-McGregor); (4) "Effects of Sugar on Learning and the Brain" (Paul Gold); and (5) "Infancy to Adolescence: Long-Term Effects of Nutrition on Growth" (Roscoe Dykman). The following presentations with policy implications and recommendations are then compiled: (1) "The School Breakfast Program" (Lynn Woolsey); (2) "Minnesota Takes the 'Fast Break to Learning'" (Mary Begalle); (3) "Breakfast at School: What We've Learned and Where We Go from Here" (Lynn Parker). Question-answer sessions followed both the scientific presentations and policy presentations and are transcribed. Closing remarks by the Under Secretary for Food, Nutrition, and Consumer Services noted that if breakfast programs are considered health-related programs and part of the educational day, they are more likely to survive in the new millennium. (KB)

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BREAKFAST AND LEARNING IN CHILDREN

SYMPOSIUM PROCEEDINGS

April 22, 1999

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CENTER FOR NUTRITION POLICY AND PROMOTION

FOREWORD

Poor nutrition affects the behavior of children, their school attendance, their school performance, and their overall development.

Over the years, federal food assistance programs have responded to malnourishment through programs that assist families, children, and low-income Americans. School lunches are available in almost all of the Nation's schools. However, despite the initiation of a School Breakfast Program, many schools do not choose to participate, depriving children of a healthy meal.

The impediments to school breakfast have been many, including concerns about funding, staff time, space, and the view that breakfast is a unique parental responsibility. However, with so many working parents and long morning bus rides, skipping breakfast isn't simply an issue of feeding economically needy children. Moreover, a growing body of research supports the common sense presumption that hungry children do not learn to their full potential.

To review the most recent scientific research on breakfast and school performance, and to consider its implications for public policy, the U.S. Department of Agriculture invited outstanding researchers in the field and involved public officials and experts to share their observations at this second symposium on issues in children's health and nutrition. The symposium was very successful and attracted over 400 people from all over the Nation.

I am pleased to make the proceedings of this conference available to you. We believe that breakfast gives children a better start to their day and their life.

Rajen Anand, Ph.D.
Executive Director
Center for Nutrition Policy and Promotion
Department of Agriculture

CNPP BACKGROUND

The Center for Nutrition Policy and Promotion was established in December 1994 at the direction of the Secretary of Agriculture. The Center is an independent resource in USDA, working cooperatively with other departments and agencies to assist in providing strategic planning and coordination for nutrition policy analysis and promotion. Through its nutrition promotion initiatives, nutrition research is translated into information and materials for health professionals, corporations, and consumers to increase public knowledge and understanding of the importance of good nutrition and its relationship to health.

The Center for Nutrition Policy and Promotion reports to the Under Secretary for Food, Nutrition, and Consumer Services. The Center is located at 1120 20th Street, NW, Suite 200, North Lobby, Washington, DC 20036. Telephone 202-418-2312, Fax 202-208-2322, Web site www.usda.gov/cnpp

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Charts and graphics used in the symposium presentations are not included in these proceedings.

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OPENING REMARKS—MORNING SESSION

Shirley Watkins, Under Secretary, U.S. Department of Agriculture, Food, Nutrition, and Consumer Services—I'm Shirley Watkins, the Under Secretary for Food, Nutrition, and Consumer Services. I am delighted that all of you are with us this morning and through this afternoon for the first symposium on breakfast and learning in children sponsored by the Department of Agriculture and the Center for Nutrition Policy and Promotion.

We're especially pleased that we are able to have the second in a series of symposiums that address children's issues and nutrition issues specifically. We're delighted that Deputy Secretary Richard Rominger is able to join us this morning. Secretary Dan Glickman had a commitment this morning and was not able to join us. And at the last minute, Deputy Secretary Rominger agreed to join us and be here with us as we kick off the symposium.

Deputy Secretary Rominger joined the Department of Agriculture in 1993 after a stint as the Commissioner of Agriculture in California. He is a former school board member, very well respected in the agriculture community because he is a California farmer.

He appreciates and respects the work that people do in the school nutrition programs, as well as all the nutrition assistance programs. I am honored to be able to present to you this morning Deputy Secretary Richard Rominger.

Remarks by Richard Rominger
Deputy Secretary, U.S. Department of Agriculture

Richard Rominger, Deputy Secretary, U.S. Department of Agriculture—Thank you, Shirley. Good morning and welcome to this important conference on the critical link between breakfast and learning. I know that many of you have come from out of town. And I want to assure you that, although the preparations for tomorrow's celebration of NATO's 50th anniversary have affected life in the city, some things about Washington have definitely not changed over the years.

I wanted to read you a little portion from an Atlantic Monthly magazine article. "Presidents, senators, honorables, judges, generals, commodores, governors, executives of all descriptions congregate here as thick as pickpockets at a horse race. Add ambassadors, plenipotentiaries, lords, counts, barons and the great and small fry of the legations, captains, lieutenants, claim agents, perpetual motion men, fire-eaters, plug-uglies, gamblers and organ grinders, together with the women to match all varieties of males, you have a vague notion of the people of Washington."

Well, that appeared in an article in 1860, a few months before Abraham Lincoln took office as the 16th President of the United States. It's also a pretty good description of what the town looks like in the midst of the NATO preparations. So we're glad you all made it here and we hope you don't have any trouble leaving Washington.

We're here today to discuss a subject that fortunately has reached public consciousness: breakfast and learning. Those of us who are parents have always felt that there is indeed a link. Who can forget telling children over and over to eat breakfast before going to school, hoping that they would listen.

But we admonished our children for years and years based much of the time on nothing more than a gut feeling combined with an astute analysis of how our children behaved and reacted. Fortunately, science has now caught up with parental intuition. And that's why we're all here today.

On the agenda are a whole host of distinguished scientists, health professionals, and educators who will give you the evidence and the facts. However, I would like to take a few moments to review the principal benefits of a good breakfast that bear repeating again and again.

Breakfast is the key to a good start every morning. This is especially true for children because they are growing and changing every day. They need a nutritional boost every morning to get the learning process going, and breakfast provides that vital boost.

A myriad of studies conducted since the early 1970's have shown that nutrition, especially nutrition in the morning, stimulates children's learning. And there are benefits beyond increased learning. There are marked improvements in attendance and behavior and a decrease in visits to the nurse for those ill-defined complaints.

Breakfast provides sugar, starch, protein, and fat, elements necessary for children to ensure a sustained release of energy and a delayed onset of hunger. Eating breakfast also improves the intake

of fiber, vitamins, and minerals, especially iron and vitamin C, all essential in a balanced diet for children.

Breakfast helps improve memory and positively affects the tasks that require the retention of new information. Conversely, a hungry child can be apathetic, disinterested, and irritable when confronted with difficult tasks. Breakfast is the key.

The Minnesota study indicates that integrating breakfast into the educational schedule of all students leads to improved learning, achievement, and behavior, as well as better math and reading scores. Children who ate breakfast averaged math grades almost a whole letter grade higher than students who rarely ate school breakfast.

Low-income children who ate breakfast have significantly improved their standardized test scores, as well as their rates of absence and tardiness. We know that poverty has a profound effect on food intake, nutritional status, behavior, and intellectual performance. In undernourished children, growth, the nonverbal aspects of development, and learning are significantly affected.

All in all, we can see that scientific research supports what we always knew, at least I think I knew it. I always eat breakfast and I learn a lot each day.

Breakfast is essential to successful learning. What we're confronted with is the prevalent image of it being somehow cool to skip breakfast. Children see breakfast as either time consuming or less important than a few more minutes of sleep. Even worse, too many young girls believe that if they can eliminate this meal, they can maintain some illusion of a perfect body shape and weight.

Skipping breakfast is neither a sensible weight reduction measure, nor a boon to the sleep deprived. We cannot allow our children to get away with missing this meal. But we're all realistic enough to know that in many households, breakfast is often not an option.

So that's why the school lunch-breakfast program is so important. In 1998, 7.2 million children in over 70,000 schools began their day with breakfast served in their schools. Over 73 percent of the schools in the National School Lunch Program also offer breakfast.

In the past 10 years, the number of low-income children served by the program grew from 3.2 to 7.2 million children. What we want to see is breakfast available to all children, whether they are low income or not.

The recent child nutrition reauthorization legislation has allowed us to implement a universal breakfast program pilot study in six States with the hope that ultimately we can offer both lunch and breakfast to all students. And Senator Johnson, we have you to thank for this pilot program and for its funding.

We're committed to making sure that children have the best possible start in their day and in their life. We believe that eating a good breakfast, either at home or at school, is part of the answer. So I look forward to today's presentations. We appreciate the time and effort and commitment that brought each one of you to Washington today for this landmark symposium.

Before I close, I want to leave you with a little checklist of parental advice to all children. In New York's Empire Diner, the following message appears on the menu: "Be nice. Don't shout. Sit up straight. Don't play with your food. Have a nice day. Take care. Don't talk to strangers. Call your mother." To which I want to add, "Eat your breakfast."

Now, I want to introduce the first of our distinguished guests. Senator Tim Johnson has been a strong advocate of child nutrition programs since his election to Congress in 1986. Before his election to the Senate, he served South Dakota for 10 years in the House of Representatives where he consistently fought for the best interests of U.S. agriculture and the health and education of children as a member of the House Committee on Agriculture and Resources.

During his final term in the House, he served as the ranking minority member of the Agriculture Subcommittee on Resource Conservation, Research, and Forestry, and also is a member of the Resources Subcommittee on Native American and Indian Affairs.

In 1991 and 1992, he was a member of the House Select Committee on Children, Youth, and Families; in 1996, he was elected to the Senate. In 1998, he sponsored the Meals for Achievement Act. And this legislation authorized pilots for school breakfasts and was passed by Congress last year as part of the Child Nutrition Reauthorization Act.

This year, the Administration requested $13 million in the President's budget to fund our school breakfast demonstrations as authorized by Senator Johnson's visionary legislation. Please join me in welcoming Senator Tim Johnson.

Remarks by Tim Johnson
United States Senator

Tim Johnson, U.S. Senator—Thank you, Richard. I appreciate this opportunity to join you this morning, and I appreciate USDA's holding of this very important symposium on breakfast programs and nutrition. It is an honor and a privilege to be with you this morning to discuss some of the issues facing our Nation's kids as we begin a new century, new millennium.

As members of the child nutrition community, your continued advocacy for effective school nutrition programs is extremely important. I commend USDA for hosting this important gathering, an opportunity to exchange ideas, insights, and recent research, and to share the results all across the United States.

I applaud all of you who come to Washington to ensure that we in Congress and our friends in the Administration understand the importance of our child nutrition programs.

Now, school breakfast is one of our Nation's best tools for the advancement and education of our school children. With that in mind, I want to share with you some thoughts on school breakfast and, in particular, as Deputy Secretary Rominger noted, the legislation I introduced, the Meals for Achievement Act.

This legislation is intended to expand the School Breakfast Program in elementary schools with a pilot program authorized by Congress last year. Now, the truth is, when we initially drafted the Meals for Achievement Act, our goal was not to do yet another demonstration program. Our goal was to utilize research that is already out there demonstrating irrefutably the value of breakfast programs for school children, to begin to implement a nationwide universal free breakfast program in our schools—voluntary to each individual school, obviously—but, at least, to make those resources available.

We ran into some resistance, budgetary not least of all. And we found that the next best step then was to broaden the demonstration programs that we have had on a very small scale across the United States. And that's what this particular legislation ultimately did.

Now, most Americans agree that education should be an extraordinarily high priority for Congress. As you know, Congress has discussed a variety of efforts intended to improve the readiness of children to take their place in America's work force in order to secure a place in a strong national economy.

For the United States to compete effectively in the world in a new global economy, we have got to have a highly educated and a very productive work force. In order to have an educated and productive work force, we've got to prepare our kids to learn. And in order to prepare our kids to learn, they've got to be—the evidence is overwhelming—well-nourished, and that begins with a good breakfast.

Now, I still believe, as I know many of you do, that the ideal is for children to eat breakfast at home, together with their families. And I have to tell you that I tire of the never-ending criticism

that providing adequate nutrition in our school is somehow antifamily. I think that's far from the truth.

We simply need to recognize the reality that more often than not in today's fast-paced world—with both parents in the work force or with a single parent in the work force—the ideal of a leisurely family breakfast together in the morning simply does not occur.

This change from years past—and there is some question whether the ideal ever really prevailed—has a very real consequence for our children. The best teachers in the world with the best standards simply cannot teach a hungry child.

As I go around my home State of South Dakota, I encounter teachers who tell me the stories of children who show up for school unprepared to learn. I hear stories of teachers who, particularly on exam days, out of their own pocket bring bagels and juice or something of that kind, finding that their kids perform much better when they've had some preparation nutritionally for the day.

But it's a patchwork. It's up to the good will and the expense of the teacher, and only on exam days. It's obvious that we've got to do better than that.

Children who begin their school day with a stomach that's growling because either they didn't have time to eat breakfast or there was no breakfast to be served, or their breakfast was a stop at the 7-11 for a coke and a candy bar, are simply not prepared to focus on the lessons being provided by even the very best of our teachers.

As our country enters the next century, we can't afford to allow a single child to be left behind. As Robert Kennedy wrote, "We need the best of many, and not just of a few." We owe it to our national interest to work hard toward excellence for all our kids. Education obviously is central to that effort. And a nutritious breakfast for elementary kids provides the bedrock for achieving that excellence.

The Meals for Achievement Act proposed to provide school breakfast at no charge for all children in prekindergarten through sixth grade. The school breakfast pilot projects authorized by Congress last year stemmed from this legislation. These pilots will assess the relationship between school breakfast and learning in six school districts.

It's my hope that, when the dust clears from yet this larger demonstration project, there can be no argument any longer in this country about the need to move on from demonstration projects to at least a phased-in, universal implementation of school breakfast programs all across the country.

These projects, more specifically, will evaluate whether providing breakfast to all kids in elementary schools increases academic achievement. As you are well aware, we currently feed 26 million children in school lunch programs while the school breakfast program, although important, still only reaches 7 million children each day.

It's my belief that, if we move forward and make school breakfast available to all elementary kids, we can remove the stigma that all too often accompanies eating breakfast at school, and we'll be able to reach many more kids who are at risk of not reaching their own God-given potential.

This Administration, to its great credit, has asked Congress to set aside $13 million in funding for continued school breakfast pilots through fiscal year 2000. I will be working in Congress so that we can honor that request. I am pleased that I can tell you that I am going to be joined by a large bipartisan group in the Congress to expand the School Breakfast Program.

As a matter of fact, approximately two dozen members of the House of Representatives recently wrote to the House Agricultural Committee on Appropriations expressing their support for continued school breakfast pilots. I've also been joined by a number of my colleagues in the Senate who have written to obtain funding for the School Breakfast Program.

It's important to note that the wisdom of enacting this initiative and expanding this demonstration project is already backed up, not only by our parents' and grandparents' common sense, but also by solid academic research at, among other places, the University of Minnesota and Harvard Medical School.

In 1994, the Minnesota legislature directed the Minnesota Department of Children, Families and Learning to implement a universal breakfast pilot program, integrating breakfast into the education schedule for all students of six schools.

The evaluation of the pilot project performed by the Center of Applied Research in Educational Improvement at the University of Minnesota demonstrated that, when all students are involved in school breakfast, a significant increase in learning and achievement results.

The elimination of the stigma of a subsidized meal increased participation from 12 percent to at least 75 percent, an enormous increase in participation, ensuring that all students begin the day on an equal nutritional footing. One student remarked, "I think it's good because everyone is the same now."

The provision of an effective school breakfast to improve learning readiness caused one teacher to remark, "I really noticed the difference this year. Last year, I saw improved concentration. This year, I see less aggression and improved attitudes."

Perhaps most importantly, test scores in reading and math went up when breakfast was provided. These learning skills are prerequisite for information in a computer-driven age. And, in the meantime, researchers at Harvard and the Massachusetts General Hospital studied the results of the universal free breakfast at one public school in Philadelphia and two in Baltimore.

Their study found that the students who ate school breakfast showed great improvement in math grades, attendance, and punctuality. The researchers also observed that students displayed fewer signs of depression, anxiety, hyperactivity, and other behavioral problems.

The areas included in the Harvard study were very low income. Combined with the results from the Minnesota pilot program, these results strongly suggest that expansion of school breakfast shows great promise across the entire range of socioeconomic backgrounds, and has the backing of the academic community.

This initiative also has the support of a broad range of organizations. I very much appreciate the support of the American School Food Service Association, the American Dietetic Association, the American Academy of Pediatrics, and a long list of others who agree with you on the importance of expanding school breakfast.

So what's next? Well, while the expansion and support from this broad background is encouraging, it doesn't mean anything if we fail to act on it. If we're serious about improving our education system in America, and I know we all share that goal, we've got to prepare our kids to learn.

The time has come to build on the pilot programs in Minnesota, Philadelphia, Baltimore, and other cities, and to integrate school breakfast into the education day, at least at the elementary school level. And I would like to go beyond that ultimately.

The Meals for Achievement Act doesn't mandate the School Breakfast Program. A local school can still decide for itself whether to participate. And parents, obviously, can decide for themselves whether to have their child participate.

I appreciate that there is a cost involved with this initiative. Therefore, we've had to phase it in over a few years. But I don't think that we should be discouraged if it takes the next several years to fully enact this change and to move on to a broader program.

The time has come to set the course for our future direction in school breakfast. I want to share with you very candidly some frustration and some clouds I see on the horizon concerning our ability to move beyond a six-school demonstration project into a more universal application of school breakfast.

I am not by nature a terribly partisan person. I'm a Democrat elected in a very Republican State. I have always noted that neither party has all the answers. Each has its fair share of bad ideas.

Among the other hats I wear is that of a member of the Senate Budget Committee. And I have to share with you some distress that I feel over the budget resolution passed by the Republican majority this year. Now, we are embarking upon an exciting new era where we are talking about budget surpluses.

It's remarkable when you think that 6 years ago we were having a $300-billion-a-year deficit; now, at least under a unified budget, a surplus. Last year's surplus was the first in 30 years. If the economy continues to go well, the prediction is surpluses as far as the eye can see, into the hundreds of billions of dollars.

Keeping in mind that all of our surpluses through 2001 are attributable to social security, we shouldn't grow too giddy about the surpluses last year and this year. But there may be some opportunities in future years to do exciting, creative, innovative kinds of things, good for our families, good for our kids, and good for the future of our country.

Now, I agree with my colleagues of both parties that, first of all, we ought to preserve those funds for social security that are needed to stabilize that program. I think there is broad-based

agreement on that. I would go further and say we also ought to be setting aside money for Medicare. I agree with the President on that. And unfortunately, that is not part of the budget resolution.

The budget resolution, after protecting social security, does provide for those social security dollars to pay down some accumulated national debt. That's a good thing, too.

It does provide for an enormous increase in defense spending and a couple of other very narrow areas of spending, and then leaves virtually the entire remainder of about $800 billion over the next 10 years for tax reduction. That's it.

Well, I want to see some tax relief, too, particularly if it's directed to middle class and working families. I want to reward those families that get up every morning and do the right thing and try to raise their kids with the right values and struggle to keep tennis shoes on the kids and make a car payment and a house payment. I think they need some help and we ought to do that with some of the surplus that's coming our way.

But I think it's folly, and I think it's contrary to the common sense of almost every American family, to think that some portion of that surplus can't also be used for some of the key areas—programs like nutrition, job training, education—that we need to strengthen so we can compete in a global economy, so we can bring everybody up to the same starting line in life, not that the government ever guarantees success in life. It can't and it shouldn't.

But we can do a better job of making sure that everybody has an opportunity to develop the skills that God gave them. And that includes nutrition programs, particularly given the relatively modest amount of resources within the overall scope of the federal budget that that would require.

I would hope that before this budget debate is concluded this year in the U.S. Congress, that we can bring a little more common sense and a little more balance back to things. It's wonderful that we can talk about these surpluses, and it's wonderful that we can perhaps provide some tax relief, along with some increased spending for defense. But there also ought to be a consideration of a handful at least of key investments we need to make in our families and in opportunities for the future. I applaud the leadership of USDA for recognizing that. I applaud our President for recognizing that we need a more balanced approach; that, along with tax relief, we also need an investment in our communities and families. And we need to do that in a fiscally responsible way.

I am afraid that this opportunity, that many of us thought would never come in our lifetimes, may slip away from us. I recall when I first came to Congress, there were three things I thought I would never see in my life. One was the collapse of the Soviet Union. The second was the fall of the Berlin Wall. And the third was that we would be arguing in Washington about what to do with a budget surplus. Well, here we are.

I would hope that this once-in-a-lifetime opportunity is not allowed to escape for the sake of ideology and to accommodate those who seem to lie awake nights fearful that the government might actually do something helpful for our families.

So that is the budget environment that we find ourselves in: opportunity, but also a great deal of challenge still ahead.

It's vital that we change the view of school breakfast from an income security measure to a component of the education day. That change will more accurately reflect how we should account for investments in school breakfast programs.

In that context, the Meals for Achievement Act raises an important policy question. And that is what is the basic purpose and goal of the School Breakfast Program? Is it a welfare program, or is it a nutrition and education program intended to prepare kids for a successful educational experience?

Now, I don't believe that we should be providing welfare to individuals who don't need that financial assistance. But if, on the other hand, the School Breakfast Program is part of the education day and is intended to prepare kids to learn, then, in my opinion, it ought to include all children.

School books are provided to all kids without regard to their income. School buses are used by kids without regard to their income. And that's how I think that we should view the School Breakfast Program.

We can't allow the continued deficit between our kids' opportunities for good education and their own God-given potential to continue to grow in this country. I think, as I know you do, that ensuring a nutritious breakfast for school kids will help close that opportunity deficit that has grown far too large.

So thanks again for this opportunity to share a few thoughts with you on where we are legislatively in terms of the budget picture on school breakfast programs. And I want to say thank you for all that you do, for being out there on the front line working on these nutrition issues with the young people all across this country and people all across this country.

Best wishes to you on a very productive and informative symposium here today. Thank you.

Introduction of Dr. Judith Johnson

UNDER SECRETARY WATKINS: Senator Johnson and Deputy Secretary Rominger, thank you so much for being here with us today. We know that you have very busy schedules, and we appreciate you helping us to get started today.

I am extremely pleased to introduce another Johnson. The Johnson family is here today. Dr. Judith Johnson is the Acting Assistant Secretary for the Office of Elementary and Secondary Education at the Department of Education. We've had such a wonderful working relationship with the Department of Education in starting our tenure here at the Department of Agriculture.

We started out working with Dr. Jerald Terozi. And when Dr. Terozi left the Department of Education, he called and said, "Shirley, you will enjoy working with my replacement. She is as committed as I am, so I think you're going to have a wonderful time with her, as well."

She is responsible for the administration of 42 federal programs with a budget of $11 billion, serving 51 million of America's elementary and secondary students. She began her career in New York City where she worked as a classroom teacher, as a guidance counselor, and served as an alternative high school administrator.

She includes among her achievements the development of the Westchester Principals Center and the Westchester Arts Program for talented high school students. She has received well-deserved recognition for her outstanding accomplishments.

And Judith may not know this, but I'll share with you, she is also a sorority sister of mine. As I read her resume, I happened to find out that she had received the Alpha Kappa Alpha award for outstanding contributions to education. Congratulations, sister, in a variety of ways.

She has also received awards from the city of White Plains, New York; from Westchester County, New York; from the National Alliance of Black School Educators; and also from Congresswoman Nita Lowey (D-NY). She holds a B.A. from Brooklyn College, an M.A. from New York University and the State University of New York. And she has completed her doctoral work at Columbia University.

I am glad to have Dr. Johnson join us today and look forward to hearing her presentation. Please give her a warm welcome.

Remarks by Judith Johnson, Ph.D.
U.S. Department of Education

Judith Johnson, Ph.D., Acting Assistant Secretary, Office of Elementary and Secondary Education, U.S. Department of Education—Sisterhood extends across the Nation. Thank you very much, Under Secretary Watkins, for inviting me here today. And I join everyone in welcoming you to this very, very important symposium.

I am going to share my brief comments with you from the perspective of an educator, one who has served in classrooms, one who has served at the building level, and, most recently, one who has served as a district administrator. I think those of you who work in schools know this: The schools can do more than probably any other public institution to improve the health and well-being of our Nation's children.

I know the importance of nutrition in one's life from birth through the early years of school. So your agenda, breakfast and learning in children, offers me an opportunity to reinforce the significance for all of you and for those for whom you will take back the message that nutrition is an important factor in student achievement. And I will focus a little on student achievement and tie it to my current role.

Many of you may be familiar with an act known as the Elementary and Secondary Education Act, first passed by President Johnson in 1965 as part of the war on poverty. That act is reauthorized every 5 to 7 years. It will be reauthorized again in September of this year. Challenges face us. And I serve as one of the key architects of that reauthorization.

What do you learn as you prepare legislation that will serve the Nation's children? You learn a lot about the widening achievement gap. You learn much about the devastations of poverty. And associated with poverty is, of course, poor nutrition. You learn that children who leave the school door unprepared for the world ahead of them never catch up. And you have this compelling need to ensure that poverty doesn't become a fatal factor in one's life and in one's well-being.

Having served so many years at the school level, I can, as you can, describe in a classroom the children who come unprepared for school, those who come without a healthy breakfast. And what do they look like? They're sluggish. They're inattentive. They can't sustain attention for long periods of time.

They show behavior patterns that lead all too often to misdiagnosis. Unfortunately, children who are hungry can sometimes be diagnosed as learning disabled or emotionally disabled when, in reality, they are merely hungry.

But being identified as learning disabled or emotionally disabled can be a sentence that sets them upon a trail of limited educational experiences that's often very hard to reverse. And all that it really reflected was the fact that they came to school hungry.

We have far too many children in this country who come to school hungry every day, unable to benefit from all that school has to offer. We know that these undernourished children score lower

on standardized tests. We know that they are unable to concentrate. We also know that they cannot fully participate in all the school has to offer.

Now, the stakes are higher for this generation than they have ever been before. Many of you may know that we're in the midst of a very important reform agenda in this country called standards-based reform. And in this reform agenda, we are focusing on achievement—of the institution and of the student.

There are consequences under this reform agenda for poor achievement. And the consequences are pretty devastating because part of the standards-based reform agenda is the recognition that we are now providing students with what we call the new basic skills. You cannot attend to the new basic skills if you are hungry.

But let me just describe them to you. The new basic skills recognize the importance of reading and math as essential to one's educational experience. But the new basic skills maintain that you cannot simply read well and compute well to be successful in school.

You need to know how to apply knowledge. You need to know how to problem-solve. You need to know how to deal with ambiguity. You need to know how to analyze and reason. You need to understand that acquiring knowledge is half of the educational experience. Being able to use it in new and unpredictable settings is the other part.

Why do we call these the new basic skills? We all live in a world that continually changes so rapidly, we can't really define what's going to happen in terms of the economy, as well as in the interrelationships between countries. We can't define that with a very clear vision.

The best set of skills we can give our children as they leave school are these problem-solving, decision-making, critical-thinking skills.

As an educator, I could not stand before a group of educators today and not take a second to talk to you about the significance of problem-solving, critical-thinking skills in Littleton, Colorado. We are in the Department totally immersed in the aftermath of Littleton, Colorado. And we're asking ourselves many questions: How did this happen and why did it happen? And we don't have the answers to this.

But we know that schools are extended families. We know that as families, we need to help our youngsters acquire not just the old basic skills that we all possess, but these new skills. As you listen to the stories that the children and adults are beginning to tell, they saw signs. But they weren't quite able to think about the problem-solving issues that those signs posed.

So it is critically important as we begin to think about the aftermath and the implications of Littleton, that we reinforce how important it is to come to school ready to learn; how important it is to understand that learning is more than the acquisition of basic skills; how important it is to understand that schools are extended families, which takes me to the school cafeteria.

The question I asked when I thought about your symposium is what exactly can we do in schools to contribute to good nutrition habits. The first thing clearly is ensuring that the school

menus for lunch, breakfast, and snacks model what we know to be good nutrition. We also know that there are often opportunities, inappropriate as they may be, for competing food sales.

It's very hard when the sixth grade comes to you and they say, "We need to sell goobers in order to take our trip to Florida or Washington." It's very hard. And yet what happens is they set those tables at the very same time that we're trying very hard to promote good health habits. So we've got these competing forces. We want children to be industrious, but we also want them to possess, demonstrate, and exhibit good nutrition habits.

So we need to ensure that we're modeling for them with our food agenda good nutritious meals and good nutritious habits. We need to create clean, safe environments for eating. During my career, I served as an elementary assistant principal. The job of the elementary assistant principal is to monitor the lunchroom. I didn't know this, by the way, beforehand, and if you're in a large school, there are four lunchroom periods.

Well, having a very strong guidance counselor background, I viewed the lunchroom assignment as a great opportunity for counseling, both formal and informal.

The first thing I did was to change the tables from square to round. Now, some of you have round tables so you know what that does. It simulates family. You see each other. You have an opportunity for conversation. And you converse over good food.

And what often happens at home—I know this is true of mine—is that our families are really strained. There are so many things that we're doing. We tend to eat and watch television, but that doesn't foster good conversation. So changing the tables from square to round gave students the opportunity to sit and talk to each other.

It also gave them the opportunity to talk about the food, which we encouraged, by the way, because if you saw large numbers of trays being emptied into the trash can, you had to ask yourself, "Are we providing both a nutritious meal and one that kids could enjoy?" We need to think about both those things.

To have a nutritious meal that kids won't eat is simply to defeat the purpose. So helping them to understand that breakfast is important and nutritious and fun is really a value that we want to share.

In those cafeterias that I had to monitor for those three and four periods, I viewed the lunchroom—we didn't have breakfast at that time—as an opportunity to acquire learning skills and citizenship skills. So think about that as you create your breakfast environments.

It is also important that you build nutrition education into your school curriculum. We can do that. We can do that through science and social studies, as well as doing it specifically in health education. We shouldn't miss the opportunity to introduce nutrition education.

And the other thing I can share with you as an educator is every time you introduce a content area that has meaning and purpose for students, you build their reading skills because they are reading for information and knowledge. It is the best way to build their reading skills.

You also, in school settings, need to develop policies to support good eating habits. You need to educate and include parents in the decision-making. We did that in my last position, where parents complained mightily about both the breakfast and lunch menus.

So we brought them to the table with the food service staff. Now, that didn't always end in agreement on what the menus should look like. I found that while I was dealing with a multi-million-dollar budget, I was also dealing with negotiating compromises on what the food menu would look like, which was an interesting digression for someone who really needed to demonstrate to the community that we were raising the level of achievement for all students.

But then we saw the importance. If parents played a role in helping us to understand what a good environment would look like in terms of nutrition and safety, they would carry those very same values home and that's what we're trying to achieve all the time. We're reversing roles in schools now. Schools are a family that models for families at home. It used to be the other way.

But we know that we have students captured for at least 7 hours a day. Families may spend less time than that with their children. This accounts for the role reversal of schools helping families understand what good habits look like. So bringing parents to the table is really important.

Coordinating all of these activities—the new basic skills, parent involvement, safety, learning environments—takes us back to the agenda of student achievement. That's what it's all about in this country, leveling the playing field, helping our Nation's poor children acquire the skills and knowledge they need to be successful, focusing on our low-performing schools and our low-achieving students, looking at every dimension of the school environment.

If your schools and your school communities don't yet see the importance of nutrition, it is critically important that our students enter those classrooms prepared to learn these new high standards being set across the country.

There are high stakes attached to these standards. And the stakes are very much associated with what happens once you leave high school and you enter the postsecondary world. It is highly unlikely that the children in school today will end their education at the high school level.

It doesn't mean that they will all go on to a 4-year liberal arts college. But it does mean this for you and for them, that we are now a nation of lifelong learners; that every opportunity for a new experience is always around the corner. Our jobs and our job descriptions change either broadly or narrowly, but they change. The economy changes. The interactions across nations change. Our students, as do we, need to be constant learners.

Reading a newspaper, reading a magazine, taking a course, are all part of the lifelong learning experience. But if children do not acquire those skills while they are in school, they are handicapped as they enter the next millennium.

Let me end this by saying to you one more time: When our children enter the classroom and their behavior is not what we call a ready-to-learn behavior, before we quickly label them as learning disabled or special-education bound, first find out if they are hungry. If they are, let's begin to

develop good eating habits for them. I think you will find that their attention to learning will dramatically improve.

You have a very, very important task ahead of you. I welcome you to this city. I look forward to the proceedings from your symposium. And please understand that we all respect and value the very important work you're doing. Thank you.

Introduction of Dr. Raj Anand

UNDER SECRETARY WATKINS: Dr. Johnson, thank you very much. We appreciate the support that we get from the Department of Education as we work on behalf of the children in this country. I want to ask one of the other subcabinet members to please stand so you can recognize Dr. Cathy Woteki, who is the Under Secretary for Food Safety and Inspection. We're always delighted to have the subcabinet join us. Dr. Woteki.

We will have other subcabinet members and representatives of the various agencies joining us throughout the day. Now it's my opportunity to and pleasure to introduce Dr. Raj Anand who is the Executive Director of the Center for Nutrition Policy and Promotion. He will introduce our researchers and the panel for scientific presentation. Dr. Anand.

SCIENTIFIC PRESENTATIONS

Introductions by Rajen Anand, Ph.D.
Executive Director, USDA Center for Nutrition Policy and Promotion

DR. ANAND: Thank you, Shirley. Recent research provides compelling evidence that undernutrition during childhood can have a detrimental effect on cognitive development of children and their productivity as adults. Our mom was right. She insisted we break the overnight fast with a breakfast.

Undernutrition impacts the behavior of children, their school attendance, their school performance, and their overall development. When children are chronically undernourished, their bodies conserve the limited food energy available. Their energies are first used for the maintenance of organ function, then for growth, and last for social activity and cognitive development.

As a result, undernourished children reduce their activity level and become lethargic and apathetic. Their behavior affects their social interaction, inquisitiveness, the ability to concentrate and perform complex tasks. It affects their overall cognitive function.

USDA provides resources to offer 7.2 million children daily breakfast. And yet many children, particularly teenagers, go without breakfast. Our able Under Secretary would like to see breakfast programs expanded so that every child has the opportunity to have a nutritious meal before starting school.

What role does breakfast play in the overall nutrition of children? What role does it play in the learning of children? How does the lack of eating breakfast affect the cognitive development of children? And finally, what are the policy implications of research findings?

This morning, we have a highly distinguished panel of experts who will try to answer some of these questions. In the afternoon, we will have a panel of policymakers and people who will talk about the policy implications of this research.

I am going to change slightly the order of speakers. Dr. Pollitt is here. He has just arrived and I will give him some time to relax. I'm going to ask Dr. Ron Kleinman to be the first speaker.

Dr. Ron Kleinman is the Chief of Pediatric Gastrointestinal and Nutrition Unit at the Massachusetts General Hospital, and is Associate Professor of Pediatrics at the Harvard Medical School. His major research interests include gastrointestinal immunology, developmental gastroenterology, nutritional support for infants and children, and nutrition and public health policy.

Dr. Kleinman has published more than 100 research articles, reviews, editorials and commentaries in leading medical journals such as Clinical Pediatrics, Pediatric Research, and American Journal of Psychology. He has served as a member of the medical advisory group on diet and nutrition guidelines for cancer for the American Cancer Society.

He was also on the Board of Trustees for the International Child Health Foundation, and Chairman of the Nutrition Committee for the Academy of Pediatrics. Dr. Kleinman graduated with a B.S. degree from Trinity College, Hartford, Connecticut, and received his M.D. from New York Medical College. Please join me in welcoming Dr. Kleinman.

Presentation by Ronald Kleinman, M.D.
Massachusetts General Hospital

School Breakfast Program and Persistent Hunger in Children

Ronald Kleinman, M.D., Massachusetts General Hospital—Thank you very much, Raj. After listening to the introductory remarks from Secretary Johnson and Senator Johnson, I am tempted to just thank you very much and sit down. I think you said it all and said it very well. But I won't.

It is a pleasure to be here with you all this morning and to describe for you the work that we've been doing over the past 6 or 7 years. Dr. Michael Murphy, my colleague and collaborator at the Massachusetts General Hospital, and I have been lucky enough to be involved with a number of very talented people in Baltimore, Philadelphia, and Pittsburgh, beginning around 1993 and more recently in Boston. And I would like to just list some of our collaborators for you.

In particular, I would like to thank the folks at the Food Research and Action Center—Lynn Parker in particular—for all the support that she gave me when I was first becoming interested in this area. We've also been quite fortunate in receiving funding from both industry and foundations.

I'm going to go through first a bit of background information. I hope to go through that fairly quickly. Then I would like to describe for you some of the work that we've done that's actually been published over the last couple of years, and then some preliminary results from work that's ongoing.

Our work began with these questions in mind. We were quite interested in this issue of hunger in the United States, and, particularly, the epidemiology of hunger; is poverty related to hunger; and, finally, what are the consequences of persistent hunger, academically, behaviorally, or emotionally. The work that I'm going to talk about then is work that we've done largely in Pennsylvania and now in Maryland.

Now, it's pretty clear that, as we look at children across the United States, most children look reasonably well-nourished. And yet when we look at national intake data, nutrient profiling data, we see that there is a pretty significant percentage of children who don't meet national recommendations, published just about a year and a half ago from the Continuing Survey of Food Intakes.

If we specifically focus down on particular nutrients, we find that daily intakes of certain minerals, fiber, and vitamins are below the recommended amounts in a very significant percentage of children; whereas, other nutrients such as saturated fat and calories, in particular, are above what's recommended.

As I said, we rarely see severe malnutrition in this country. And when we do, it's largely in the hospital among chronically ill children. But there is one group of children who are at particular risk for nutrient deficiency.

These are children who live at low income or are in poverty. And that comprises quite a significant proportion of children in the United States today. This number hasn't shifted very much over the last couple of years.

Because of that large percentage of children in poverty and cutbacks in support of nutrition programs for people who live in poverty, the demand for school feeding programs and food kitchens and so on—the demand for their services—has risen over the last couple of years.

These aren't children who have marasmus or kwashiorkor. These are children who look like every other child. But they are, in fact, children who are hungry.

And if we look at the school breakfast and school lunch program, we see what Senator Johnson talked about before. They feed a very significant number of children every day. Overall, about half of the children in the United States eat school lunch every day. And about a quarter of those eat breakfast in school every day.

But if we look at poor and low-income children, we drill down on that segment of the population, we see those percentages increase very significantly. Seventy percent of poor or low-income children eat school lunch each day and almost a third eat school breakfast. If we look further at school breakfast programs, six out of seven children who are eating breakfast in school qualify for either a reduced-price or a free breakfast.

So that leads to the question of what is hunger. And this definition is actually fairly recent—the uneasy or painful sensation caused by repeated and involuntary lack of access to food—and it's a definition that's allowed us then to explore the epidemiology of the problem. The first data on the epidemiology of hunger in the United States comes from a project called the Community Childhood Hunger Identification Project (CCHIP), a study that was sponsored by the Food Research and Action Center.

Since most of you are familiar with this, I'm not going to spend very much time going through it. It's based on eight questions. Four of them pertain to adults in the family and four of them are particularly focused on the children in the family.

If none of the questions are answered in the positive, then that family is classified as not hungry. One to four questions answered in the positive classifies the family as at risk for hunger; more than four positive answers would classify the family as hungry.

From that survey, we get a prevalence of roughly 29 percent hungry or at risk: 8 percent hungry and 21 percent at risk for hunger. This is supported by more recent data from the USDA which comes to very similar conclusions. Twenty-four percent of all U.S. children experience hunger or food insecurity persistently.

Now, those are data for the entire population. But if we again drill down on those children who are poor or live in poverty, we see just how astronomical those numbers become. Almost three-quarters of those children qualified as hungry or at risk for hunger, a significant portion of that population.

So what? So some children are hungry and they're hungry persistently. What effect does that have on these children in terms of their growth and their development? Well, this leads me to the goals that we described for the first series of studies. And I'll go through these with you quickly now.

First, we wanted to see whether or not there was a relationship between child hunger, particularly on the CCHIP scoring system, and standardized measures of psychosocial functioning. We wanted to confirm that children were agreeing with what parents were reporting about their children's hunger; that is, if a parent said a child was hungry, that the child also reported being hungry.

We wanted to know whether or not those answers were stable over time. If they said they were hungry in January, was that likely to be true in June, as well. We wanted to extend our understanding of the psychosocial consequences of hunger by examining children with a broad range of psychosocial measures.

And then we wanted to look at the effect of an intervention, a relatively simple and cheap intervention on the way children function. That's breakfast, and in particular, school breakfast.

Thus we looked to see whether or not implementing a universal school breakfast feeding program had any effect on academic and psychosocial functioning over a period of one semester.

So to return to our first goal. We wanted to see whether or not hunger was related to psychosocial functioning in a very narrow sense, using a single measure, the Pediatric Symptom Checklist. This study was conducted in Pittsburgh with a probability sample, 328 elementary and middle-school children.

The CCHIP interview was conducted with the parent and then the parent completed a one-page pediatric symptom checklist. This symptom checklist is now a widely used instrument. It's used in pediatricians' offices for the most part to assess whether children are at risk for psychosocial problems.

If they score in the at-risk category, then they would be children that need to be referred for assessment and intervention. The items on the checklist are rated as occurring never, sometimes, or often. A higher score suggests the need for further evaluation.

What we found is that 21 percent of hungry children scored in the impaired region on the pediatric symptom checklist as opposed to 3 percent of nonhungry children, a very significant difference. Now, I want you to keep in mind that it's well known that children who are poor or live in poverty also score poorly on these tests.

What we're doing here is comparing children who are poor and hungry to children who are poor and not hungry. So if you are poor and hungry, you are significantly disadvantaged above being just poor.

To elaborate a little bit on the findings, 29 percent versus 14 percent of these children, hungry versus not hungry, were likely to have taken special education classes. There was a history of counseling among the hungry of 21 percent versus 5 percent in the nonhungry. And 25 percent of the hungry children had repeated a grade versus 12 percent of the nonhungry children. All of those are significant differences.

Although there were significant correlations with each item on the pediatric symptom check list, inattention and aggressive and behavioral issues were some of the items that most strongly correlated with a hungry score.

Next we examined this issue by looking at stability over time and extending the psychosocial profiles to include what the children have to say as well as what their parents have to say. These studies were conducted in Baltimore and Philadelphia. Our sample was 204 children randomly selected from a much larger population.

Beginning of a semester and the end of the semester served as the time points. There were a variety of psychosocial measures that we employed. These are tests that look at what the parent alone or the child has to say about their own behavior or performance.

We looked at a measure of teachers' ratings of the children. And then we looked at some school and academic measures, including grades and absences, and the Global Assessment Scale that was administered by a skilled clinician.

What we show is in fact that there is excellent agreement between the parent and the child, and there is very good agreement over a period of 4 to 6 months. And again, as in the first study, a significant number of these children are reported to be hungry.

Among a low-income group of children in inner-city Philadelphia and Baltimore, the hungry children were significantly more likely to be depressed, anxious, functioning poorly overall, have poorer grades, be absent more days from school, and be more inattentive in the classroom.

Now, what happens if we provide some intervention? This is the third study that I'll report on. Here we looked at the effect of a universal school breakfast feeding program. We wanted to assess changes in functioning for students who increased their school breakfast participation over the course of 6 months, 1 semester.

This study involved 133 pairs of parents and students who were interviewed separately and, again, randomly selected from an elementary school and two middle schools in Baltimore and Philadelphia. The school staff provided us with records of attendance and grades and information about breakfast participation.

You can see that there was a similar distribution among those who rarely eat breakfast, less than once a week; those who ate some breakfast, two to four times a week; and those who ate breakfast often, more than four times a week.

There were some significant differences with regard to ethnic status, minority versus nonminority. That is, the minority children were much less likely to have eaten breakfast often than the nonminority children. But the majority of all these children in the study were classified as minority.

There were no differences in gender or parents' marital status. The findings—very similar to our earlier findings—show that students who ate school breakfast were again significantly less likely to be anxious, depressed, and so on.

At baseline, there was a full grade difference in math between those who rarely ate breakfast and those who ate breakfast often. There were more days absent and days tardy among those who ate breakfast seldom than those who ate breakfast often.

On teacher measures, the teachers were significantly more likely to rate a child as having behavior problems in the classroom if they ate breakfast rarely than if they ate breakfast often.

Now, over the period of the semester, 42 percent of the students increased their breakfast participation once universal breakfast was implemented. Thirty-seven percent remained the same. And actually, 20 percent or so decreased their breakfast participation.

And what happened over this period of time with the other outcomes I mentioned earlier? Well, again, if you increased your school breakfast participation, you were significantly more likely to show decreased child-reported depression, decreased parent-reported overall psychosocial dysfunction, decreased teacher-rated hyperactivity in the classroom, improvement in math grades, decreased absences and improvement in tardiness.

So these results seemed to be remarkably consistent.

Now, what is the effect of implementing universal school breakfast? Do more children eat breakfast? Well, in that very limited study I described, some 40 percent of the children increased their participation in the program. In Philadelphia, once they implemented universal feeding, there was a very dramatic increase over a period of 7 years: a fourfold increase in breakfast participation.

And you can become innovative and introduce breakfast in a variety of ways besides introducing it into the cafeteria; for example, using breakfast carts in the hallway outside the classroom or even introducing the breakfast right into the classroom at the start of the school day.

So we wanted to see what happens when you provide school breakfast right in the classroom. This is a study that's now in progress. And I am now going to describe for you, for the last part of what I have to say, some preliminary data from ongoing studies.

In six Baltimore schools with about 2,400 students all together, universally free classroom breakfast was introduced in the middle of the 1996-1997 school year. Three schools served as controls and didn't begin a free breakfast program until the following year.

In total, 81 percent of the children in these school districts were eligible for a free or reduced-price meal. A very dramatic increase in breakfast participation occurred in the schools that began classroom breakfast feeding compared to the schools that did not.

Average daily attendance increased in those schools where breakfast feeding was implemented, and it actually decreased in those schools that served as controls. When we looked at tardiness, the same thing occurred. Comparing the pre-classroom feeding to post-classroom feeding, there was a decrease in the number of tardy episodes.

Disciplinary episodes also were cut in half in those classrooms that started classroom feeding compared to those that didn't.

Now, we've been looking at individual students, but we also wanted to look at this on a schoolwide basis, as well. And so we have looked at 31 Baltimore public schools where a universal free breakfast program is in place. We wanted to take a snapshot of those schools, looking at attendance and other schoolwide indicators.

Again, breakfast participation increases very significantly when you implement classroom feeding. Now we're looking across schools, not at individual students. Attendance increases, whereas it decreases in the schools where it wasn't implemented. Thus, there's a pattern of very consistent results across all of these studies.

I'm going to conclude with preliminary data examining the effect of the Maryland Meals for Achievement Act.

In a random sample of a hundred of these students from Maryland public schools, we wanted to survey their satisfaction with the newly implemented school breakfast program. On a one-page questionnaire with open-ended questions, parents, staff and students in fact showed a high level of satisfaction, saying that this program offering universal free breakfasts had a positive effect on learning and behavior.

This is a purely subjective survey, but we wanted to get some sense early on whether the program was being accepted by those who were part of it. And that seems to be the case.

Then in a more intense look, we now have data on 520 students, over 300 parents, and 117 staff from five schools. Again, satisfaction seems to be quite good. Fifty-seven percent of the students, 70 percent of the parents, and over 60 percent of the staff again report that the program had a positive effect on academics and behavior.

School suspensions seemed to decline. And surprisingly—I'm not sure how to explain this—visits to the school nurse decreased in these schools, whereas in the control schools, the number of visits to the school nurse actually increased over time. A number of these findings are interesting and they bear further investigation.

So to conclude, the parents, students, and the staff seemed to appreciate classroom feeding. It hasn't proven to be an obstacle to teaching. In fact, if anything, it seems to be enhancing the school day.

In summary, acute hunger and starvation in the United States are clearly unusual. But mild to moderate hunger is common. And it affects perhaps 25 percent of all children in the United States.

More than 40 percent of children in this country today come from low-income or poor families. A much higher percentage of these children are hungry. And those children who experience moderate hunger have some very significant psychosocial consequences of that.

Making breakfast free can double participation in a breakfast program over time. If we use classroom feeding or a breakfast cart, we can boost participation even more significantly. And the breakfast program has a very significant impact on children's behavior, both academic and psychosocial.

And finally, as Senator Johnson said, where do we go from here. Well, I hope that the Meals for Achievement Act will be the first of many that will support these kinds of programs.

We are very interested in looking at the effect of breakfast on nutritional status over time, and whether the effects that I've described to you will persist over a long period of time. We are also interested in the effect of nutrition education in school and what that does to eating patterns and nutritional status over time. And hopefully, that's going to lead to many happy families and many productive children. Thank you very much.

Introduction of Dr. Ernesto Pollitt

DR. ANAND: Thank you, Dr. Kleinman, for a wonderful presentation. Our second speaker has come all the way from University of California-Davis. Dr. Ernesto Pollitt is a Professor of Human Development in the Department of Pediatrics at the University of California-Davis. In addition, he is an advisor to a graduate group in nutrition and graduate group in human development, child psychology, with the same university.

Dr. Pollitt received his Ph.D. in 1968 from the Department of Child Development and Family Relationships at Cornell University. This year, Dr. Pollitt received an award in international nutrition. This award was granted by the Society of International Nutrition Research, which is actually a division of the American Society for Nutritional Sciences.

Dr. Pollitt has done a great deal of work in this area of breakfast. He is going to present to you this morning school feeding and educational outcomes. Dr. Pollitt.

Presentation by Ernesto Pollitt, Ph.D.
University of California—Davis

School Feeding and Educational Outcomes

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Ernesto Politt, Ph.D., University of California—Davis—Good morning, everybody. What I will present today is a general overview of how I see the problem, what the tasks ahead are, where we are right now, and what can be achieved in terms of school feeding.

I apologize if some of the things I say you already know very well. But I would like to cover some background information because I think it is important.

There is really a strong justification for school feeding on different levels. In other words, it is not just a policy decision. It is not a decision that is taken because it just seems right to give breakfast to children.

You can think in terms of three different layers, one at the level of the child who is sitting at a desk. Then there is also justification at the social level, at the level of how school feeding helps the family. And we also have to include some esoteric scientific reasons for doing it. In other words, there is a science behind it.

At the level of the child—from now on, we'll speak about the 9- to 10-year-old child—there are three considerations. First, the last meal of the day is going to be dinner. After a period of an hour or so, the child will go to bed and will not have anything to eat until the following morning.

If that child does not have something to eat, the organism is going to react to that absence of fuel, absence of food. The organism is going to start compensating in a number of ways so that there can be homeostasis, the maintenance of balance.

If we do not provide that fuel or that food, the organism is going to change, and the change is going to interfere with performance.

Now, that's one reason. A second reason is, think of height or weight or any other personal characteristic. You will obviously notice that there is a very large variability in height and weight among people. There is a variability among groups of people. There is a variability among societies.

Well, there is also a variability in terms of the response of the organism to needing or not needing food. In other words, there is a response to the number of hours a child can be without food. And there are some children that within that normal distribution are particularly vulnerable.

In other words, some children who may need it more than others. We have to think also in those terms. We do not know how many there are. There may be 10 percent. There may be 25 percent. We have no idea. But you can be absolutely sure that not all children are going to respond in exactly the same way to the lack of breakfast in the morning.

There is also going to be a large variability at 11:00 in the morning in terms of how they are going to feel. Some are going to feel lousy.

Also, as the previous speaker mentioned, there is a very important nutritional factor involved. We know that there is a certain percent of the population, certain percent of children, whose daily intake is not satisfactory in terms of Recommended Dietary Allowance (RDA), in terms of whatever nutritional criterion you want to use for function.

You are going to say, well, these children are really not eating what they should be eating during the day. The breakfast or school feeding program could actually ensure that the daily intake of the child, if it's not perfect, is going to be close to normal or close to what is necessary. Therefore, there is an opportunity to actually prevent or remedy to some extent problems of hunger or malnutrition or specific nutritional deficiencies.

I've been involved with the WIC program for example. I had to serve on a committee on the evaluation of the scientific criteria for the WIC program. Now, you all know that the WIC program is a supplementary program for feeding mothers and children in the United States. It has an important function in our society.

WIC has been with us since the early 1960's. No one really knows how WIC operates as a support system for the family. Now, I can tell you and many investigators can tell you that WIC actually provides one of the most important interventions for the prevention of iron deficiency anemia. Fine.

We also know that it has a very important function in the rehabilitation for nutritional anemia. But we don't know whether WIC actually operates as a support system for the family. Exactly the same idea is applicable to school feeding.

Now, there is one thing that has happened since the 1940's as this country has gradually built up its school feeding program. An institution has been created that actually distributes nutrients to a segment of the population, and families have incorporated that institution into their operational systems; and, therefore, school feeding is really complementing the function of the family by providing or helping with the distribution of nutrients.

That has, one, an economic implication; two, a nutritional implication; and three, a social support implication. The mothers, fathers, or caretakers are going to feel that the child will have something to eat at school.

Last, in a way which is related to what I was saying before, this country does not have an established health policy.

The way the country operates is, for example, that you are probably affected in many ways by decisions taken in reference to Health Maintenance Organizations, decisions taken in reference to insurance companies, and decisions taken regarding the budget for school feeding or the budget for WIC or how many children are going to be able to receive medical coverage.

Although these decisions, all these activities, are not coordinated into what you would call a centralized health policy, they are an implicit health policy for this country.

Like it or not, school feeding is part of our health policy. The U.S. Department of Agriculture is intervening into the society to prevent and, to some extent, to remedy problems that may have something to do directly with health stabilization of children. And therefore, the school feeding program has to be considered as a public health intervention. As a public health intervention, it fulfills a role that is extremely important within our society.

The last point that I wanted to make is from a scientific perspective. Aside from the political and social policy component, it is tremendously interesting because it raises a fundamental problem of how we operate.

The question is, is it really possible that our brain can vary in its function, that memory or attention can actually be affected by a relatively small variation in the availability of nutrients and energy. Think about it.

You may think the brain is not going to suffer for such a short-term fluctuation, but the alternative is that it does; that the brain is not as impermeable as we think it is; that we are now really close to making a conclusive judgment that the brain does fluctuate in terms of function, of how well it performs, due to the variability in the availability of fuel and nutrients.

Now, let's move to another point. We are going to move to the issue of the strongest justification for school feeding. Well, the strongest justification is obviously nutritional because children need food, and you have to protect them.

In addition to that, a very strong justification is educational. You are going to say school feeding needs to exist because children who do not have those nutrients or do not have that fuel are not going to perform well. This is the educational justification.

Well, if you say that, then you have to identify three different or separate mechanisms whereby school feeding could actually affect the child. One, which I have already mentioned, is this variability in function that depends in part on metabolic changes produced by the number of hours that a child is without food.

Two, which I have referred to, is that when there are nutritional deficiencies such as, for instance, iron deficiency anemia, it is very likely that there are going to be also changes in functional or intellectual performance.

So you have to think in terms of how the school feeding program or the School Breakfast Program participates in maintaining the health and the nutritional state of the children, thereby preventing deficiencies that would interfere with function.

And the third mechanism, which may relate to what our previous speaker said, has to do with hunger. In other words, there has to be a cognitive component to the feeling of "I didn't eat breakfast," "I didn't eat lunch," "I don't have enough food," "I have not eaten since last night," "There is no food at home." These cognitive components of the child's everyday life may also interfere with performance.

Now, what is my job in all this? My job, and what I have done for the last X number of years, is to generate technical data that can be used for social policy decisions. That's what I see as my function within the academic system, within the university system, within the government system.

I have adopted a role of actually trying to address some of the specific questions that are relevant to the population and trying to generate information that can help the government make intelligent decisions.

At the same time, there are interest groups; and you are an interest group in many ways. In other words, you have an interest in the existence, the continuity, the adequate function of school feeding, of school breakfast. And therefore, you are interested in looking at technical data that will actually support the interest that you have. At the same time, there are other people who are not interested in school feeding.

There was a strong opposition to the WIC program at that point in time by some groups. There are also groups that are against the expenditure of large amounts of funds for breakfast or for feeding. Technical data will help you and will help them because we are obligated to make reasoned decisions.

However, it is difficult to evaluate school feeding for two reasons. One is that in the United States—this applies to the history of school lunch more than school breakfast--school lunch was transformed gradually. It was a fairly small operation in the early 1940's. And then it grew and grew.

When people started to realize an evaluation was needed, it was already too late, because we had lost the possibility of implementing a research design that would allow for objective data.

It is very difficult to evaluate school feeding. Our previous speaker, for example, spoke about a design that is quite interesting. In other words, what he said was—if I understood correctly—that there is one group of children who are placed in a set of schools that are going to have a school breakfast after a period of time; another group that is not and that is going to start the school feeding later. So there is a possibility of a comparison between these two.

But even if you do that, it is complicated sometimes when you need randomization of schools or there are problems when some of the people involved in the schools that do not receive the breakfast say, "We don't want to participate in this. We want to have the school breakfast now."

And then when you enter into the school, it is very difficult to evaluate performance in the classroom and achievement over a year. But we absolutely need evaluations.

There are three things that we need to do. Because it's my job in part, I see it from a selfish perspective.

First, we need to demonstrate without any doubt, conclusively, with scientific rigor and objectivity, that this variable—school feeding, school breakfast—has an effect over these other variables, which are memory, attention, reasoning, logic, arithmetic; and that if you move one, the other component is also going to be moved. That we do need so that we can write and we can present information in a conclusive way.

Everyone in this room feels that there is enough information. That is not the case. We have a lot of suggestive information.

I'm going to take one step back. There is one item of information that I think is conclusive right now. And that is, school attendance goes up. That is one piece of information that you can now back up in a very solid way.

The other aspect—conclusive data on the effect on the outcome variables that I mentioned before—is a little more difficult to get. We're getting there, but we still don't have it.

Now, let us assume that we already have this information, that we do know that having school breakfast will have an effect on memory function at 11:00 in the morning. I wish I could tell you that I know that. I don't know.

But if we were to know that, the second and more difficult thing we need to know is how to identify those children that are at the highest level of vulnerability. In other words, we need a level of information that would allow us to say this group of children living in this population or under these social and economic circumstances are the ones who have the highest vulnerability.

Why is that important, if we know that school feeding exists already in almost 100 percent of the territory of the United States? Well, we need to know that because the amount of participation in the school feeding is not as high as one would wish.

In other words, as you know, many times, we do have school feeding, we do have a School Breakfast Program, we are working with a population that we know needs it. And yet, unfortunately, for whatever reasons, children do not participate in the way that they should.

And then, third, once you have established causality, once you have established risk, then you need to explain it. You need to go to the mother who may not have the same level of education that you have—or to the neighborhood, to groups of mothers or caretakers or families—and explain to them why it is that this support system, public health activity, educational activity must be used.

Those are the three tasks that we have right now. One, getting conclusive information. We only have conclusive information on attendance. But we are getting there. Two, we need to identify those who are at highest risk. And three, we need to inform the population. We need to give them the knowledge that we have of why it is important for children to have breakfast. Thank you.

Introduction of Dr. Sally Grantham-McGregor

DR. ANAND: Our next speaker, Sally Grantham-McGregor, has come all the way from London, England. Dr. Grantham-McGregor received her M.B.B.S. and M.D. from St. Mary's Hospital Medical School, University of London. She is currently a Professor of Child Health and Nutrition at the Centre for International Health, Institute of Child Health in London.

While Dr. Grantham-McGregor has a wide and variable background, she is best known for her work in schoolchildren's health and school performance which she is going to share with us this morning. She has done extensive work in normal child development, malnutrition, mental health, and studies in growth retardation, mental development, and adolescent health.

Dr. Grantham-McGregor received a special award from the Jamaican Ministry of Health for her contribution to maternal and child health through research in 1995. Please join me in welcoming Dr. Sally Grantham-McGregor.

Presentation by Sally Grantham-McGregor, M.B.B.S., M.D.
Centre for International Child Health, London

The Effects of Breakfast on Children's Cognition, School Achievement and Classroom Behavior

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Sally Grantham-McGregor, M.B.B.S., M.D., Institute of Child Health, London—I would like to thank the Department of Agriculture for inviting me.

I have spent most of my professional life studying the effect of poor nutrition on children's development and what we can do about it. I really welcome this initiative by the Department of Agriculture because I think that providing breakfast in schools is a very promising intervention.

Now, I see my role very much as the previous speaker sees his, and that is to provide data for policy makers and program designers to use. However, the results are not always as good as we would like them to be. But I hope that they are, in fact, the truth, and indicate what we will achieve if we initiate breakfast programs.

Although I'm now based in London, all the work that I'm going to report here was done at the University of the West Indies. And before I begin, I would like to acknowledge the contribution of my colleagues there: Christine Powell, Susan Chang, Sue Walker, and Donald Simeon.

There are many ways in which school feeding could possibly benefit children. If the meal is provided free or subsidized, it is a way of transferring income to poor families. It is also possible that you can inculcate good dietary habits into children while they are at school that will continue throughout their life and promote good health. I think there is also a likelihood that, if children eat together in fellowship, this can help. It is most likely to help children who don't have the attention at home that they should have, either because the parents are rushing out to work in the morning, or because parents can't get out of bed, for various reasons, to help them and supervise their breakfast. If these types of children have the opportunity of eating at school, I suggest that sitting down and eating breakfast together might well benefit their social and emotional development. However, this symposium is focusing on attainment in school. So that's what I'm going to deal with this morning.

Mechanisms Linking Breakfast to School Achievement

I would first like to go over the possible mechanisms whereby breakfast could benefit children's development. One mechanism is that breakfast can improve the nutritional status of children if they are undernourished. And in this country, I think iron deficiency may be the most important deficiency. But you may also have some children with marginal protein energy malnutrition. There is quite a lot of evidence to show that if you can improve these nutritional conditions, children's behavior and cognition will improve.

Also, providing breakfast can make available more time in school for the child. Attendance may go up and children are less likely to be late for school if they know they can get breakfast when they reach school. So the actual time in school would increase.

Another possible pathway is the relief of hunger. Where children haven't had breakfast at home, then the relief of hunger may improve cognition and behavior. So not only would the time in school be longer, but the actual time learning and being engaged in the task would increase if children's attention were better.

All of these, more engaged time and improved cognitive function and behavior and better nutritional status, should lead to better attainment. Now, that's the theory. What is the data showing? What in fact happens?

Jamaican Studies

I'm going to quickly outline a series of studies that we did in Jamaica on school feeding. Now, Jamaica is not that different from the States inasmuch as malnutrition is not very common. We don't see really severe cases of malnutrition very often except a few in the first 2 years of life.

First Study

The first study we did was a small one. And there were just three classes involved. We gave breakfast to one class and the other two classes did not get breakfast. The classes were in a rural school and they were all at the same grade level. It was an enormous school and there were 10 classes at that grade level, which were in ability streams. We took the classes in the lowest three streams and gave the middle class breakfast, and the other two classes were used as controls. The outcome measures that we used were the Wide-Range Achievement Test with arithmetic, reading, and spelling subscales and height and weight. We also looked at attendance. Because classes differ, we monitored the children's progress over the first term before breakfast was introduced and then over the second term when breakfast was introduced. The two control groups reacted in the same way, so they were combined together for analysis.

These children were not very high achievers and in the first term the improvement was very small, but similar in all classes. In the second term, when breakfast was introduced, the improvement in arithmetic scores was greater in the breakfast group than in the control group. So there was a significant improvement in arithmetic in the children who had breakfast, compared with the controls.

We have a big problem with attendance in Jamaica, and attendance declined over the school year in both groups. However, the decline was significantly less if they had breakfast than in the other two classes that didn't have breakfast.

In summary, we found significant improvement in arithmetic and attendance, but we were not able to show an improvement in spelling, reading, height, or weight. However, the intervention was only for one term and maybe that wasn't long enough to see an improvement in nutritional status. Also, we only looked at the children's height and weight and not iron status. Because there was no improvement in nutritional status, we thought that the gains in arithmetic may be due to the relief of hunger. We then wanted to move on and ask whether short-term food deprivation, just missing breakfast for one day, would affect cognition.

Second Study

We decided that we would like to look at high and low risk. So we had two groups: 60 children who were short for their age, and 30 children from the same classrooms matched for age and sex who were adequately nourished. Both groups came into a research unit on two occasions 1 week apart when they stayed overnight. They were randomly assigned to having either a placebo which

was a drink of tea, or breakfast, on the first occasion. On the second occasion, the treatment order was reversed. And if they had a placebo the first time, they had breakfast the second time and vice versa. At 11:00 in the morning on both occasions, they were given a battery of eight cognitive tests.

We found that when the short children missed breakfast, they did much worse on two tests of cognition. One of these tests was fluency which measures how many ideas you can generate in a set time, and the other test was coding. In contrast, the adequately nourished children were not affected.

When we split the children up according to whether they were thin or what we would call wasted or not, we found that the wasted children were also detrimentally affected by missing breakfast in two tests. One of these tests was digit span backwards, which consists of repeating strings of numbers backwards and is a test of memory and some cognitive processing, and the other test consisted of problem-solving.

In summary, the study showed that missing breakfast detrimentally affected stunted children in fluency and coding, and wasted children in digit span backwards and efficiency of problem-solving.

Third Study

We then wanted to go into the schools and see if we got the same finding, because you don't have the same control in school studies as in laboratory studies. We don't know what the children ate the night before, what they had for breakfast at home, how far they had to walk to school, etc. This lack of control is what we would call "noise" in an experiment.

We studied children in four schools in grades 3 and 4, and we again identified 100 children who were underweight and we matched each child with a child in the same class and the same sex who was not underweight.

We gave breakfast to the whole class for 2 weeks, but we only monitored the study children. Then we left the school for at least 2 weeks, then returned and gave the children a placebo for 2 weeks. The breakfast comprised about 25 percent of their daily requirements in calories and protein. We measured the children's cognition and behavior in both periods.

We controlled for the order of giving breakfast, because children change over time anyway. So half of the classes had breakfast the first time and half of them had just a tiny piece of orange which we used as a placebo to control for the extra attention, because sometimes the attention alone can make a difference.

To measure cognition, we gave the children four tests. We found that, again, the undernourished group did better in fluency when they had breakfast. This was the same test that was significant in the previous laboratory study. And similarly, the adequately nourished children were not affected.

We also studied the children's classroom behavior. We observed each child for two mornings in a teaching situation and a situation where they were given a set task. We noted if they were focusing on the task that they should be doing which is a critical variable in terms of learning. We also noted if they were talking when they shouldn't be talking; if they were moving around out of

their seats when they shouldn't be moving around; and if they were participating in the class teaching, for example, if they were answering questions, putting up their hands, and things like that. We looked at these four behaviors in both the breakfast and placebo situation.

When we looked at the "on-task" behavior in the teaching situation, we found that only one of the four schools showed a significant improvement with breakfast in that they were more on task. The same school showed a reduction in undesirable gross motor behavior when they had breakfast, and the other schools were not affected.

However, in the teaching situation, two of the schools showed an increase in undesirable talking when they were given breakfast, whereas the others were not significantly affected. So this is the reality. The behavior in these schools actually got worse.

Similarly, in the set task, the on-task behavior was reduced in the same two schools. We were absolutely horrified when we first saw this data.

So we went back into the schools to see what was happening. The school where the children behaved as we hypothesized and improved with breakfast was a gift school from some international agency. Each child had their own desk. The classrooms were spacious and they had a certain amount of equipment. They were light, and each class had a separate room.

In contrast, the schools where the behavior got worse were very different. They were dark, they were overcrowded, the children were sharing desks, and there was more than one class in the same room. So if you have chaos and you feed it, the chaos gets worse.

This is therefore a caution: don't think that giving breakfast is going to solve all your educational problems. You need a good educational infrastructure, as well. And it's foolish of us to try to separate the two. Breakfast must be an integral part of good education.

Fourth Study

The most recent study I am going to describe was a very rigorous one. We noticed that the schools were very different, and even the classes within schools were very different. Therefore, you can't really match one school with another school and assume that, if you treat one school and not the other, the differences are due to the treatment.

We therefore randomly assigned children within each class to receiving breakfast or no breakfast. This is quite difficult to do; therefore, we only studied a few children in each class so that the other children didn't feel in any way left out. At least, we hope they didn't.

We studied children in 16 schools, in grades two to five. Children in grade one are difficult because they can't read and write when they begin, and it is difficult to get baseline data. Grades six were too busy doing scholarship exams, and the schools didn't want us to study them. So that's why we were in grades two to five.

We identified 400 children who were underweight and 400 children with adequate weight who were in the same class and of the same sex. Both groups were randomly assigned to breakfast or

placebo. Now, these children were spread over 16 schools and four grade levels, so that there were just a few children in each class.

This time, instead of feeding the children for 2 weeks, we fed them for as long as possible in the school year. By the time we got our measurements in, the breakfast program had lasted for about 8 months. The placebo again was a small piece of fruit. We used the same measurements as before: spelling, reading, and arithmetic; height, weight, body mass index, which is a measure of how fat or thin you are; and attendance.

There was a significant height spurt in the breakfast group and a significant weight increase. There was also a significant increase in the body mass index.

In arithmetic, the girls did better than the boys, which usually happens in Jamaica, and breakfast had a significant benefit. We found an interesting difference between the grades; the children in grades two and three made a significant improvement in arithmetic if they had breakfast, whereas children in higher grades didn't show so much improvement. These children were generally not making good progress, but the breakfast group gained one-third more in arithmetic scores than the non-breakfast group. So it was a substantial improvement in arithmetic.

We then looked at attendance. We used the first 2 months of the year for a measure of baseline attendance before the breakfast program began. And we found that if children didn't have breakfast, their attendance declined over the school year. If they did have breakfast, it declined significantly less. And it was exactly the same whether they were poorly nourished or adequately nourished. So attendance improved significantly with breakfast. And here I must concur with Ernesto Pollitt that this result has been found in many countries and in many studies now. I think it is really well established that attendance improves with school breakfast.

In summary, attendance improved; weight, height and BMI improved; and arithmetic improved in the lower two grades. But reading and spelling did not improve, and we didn't look at any other subject.

When we put all our studies together, what is the take-home message? We have shown from these series of studies that you can improve children's nutritional status. We didn't look at iron, but there is no reason to believe that you can't improve their iron status.

You can also improve their attendance and their behavior in well-organized classrooms; cognition; and arithmetic. Also high-risk children are most likely to benefit.

What are the policy implications of these findings? I think that there is enough data to justify breakfast programs. Personally, I would target high-risk schools, but this depends on your resources.

If you have plenty of resources, fine, then provide all schools with breakfast. If you have limited resources, for instance, like we do in Jamaica, provide breakfast to schools in high-risk areas--not to target children within schools, but to target high-risk areas where children are generally not doing well in school.

Obviously, we should combine educational programs and improvements with breakfast. And we shouldn't expect great improvements where schools are poorly organized. Finally, being a researcher, I would make a plea for more long-term evaluations looking at other school subjects, and also the children's social development and emotional development, which I think we're all very conscious about right now, as being critical. Thank you.

Introduction of Dr. Paul Gold

DR. ANAND: Thank you, Dr. Grantham-McGregor. Our next speaker is Dr. Paul Gold who is a Professor of the Psychology and Neuroscience Program in the Department of Psychology at the University of Virginia. He is also head of the Psychobiology Program at the same university.

For the past 15 years, Dr. Gold has demonstrated that administration of glucose enhances cognitive function and described the mechanism by which glucose acts. Dr. Gold graduated with a B.A. degree in zoology from the University of Michigan. He received his M.S. degree in neurobiology and Ph.D. in psychology and neurobiology from the University of North Carolina. He is the editor of Neurobiology of Learning and Memory.

He is going to share his research on the effects of sugar on learning and the brain. Dr. Paul Gold.

Presentation by Paul Gold, Ph.D.
University of Virginia

Effects of Sugar on Learning and the Brain

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Paul Gold, Ph.D., University of Virginia—It's a pleasure to be here. I appreciate the opportunity to speak to you. This is not the usual audience that invites me to present my research. I'm much more likely and frankly more comfortable talking to audiences that expect me to talk about brain science and not about education policy.

The challenge for me today is going to be to explain my current basic research program in a manner that illustrates directions that may be of use to you and I hope of interest to you.

The research I will be describing is research on the effects of hormones and glucose, the basic sugar, and cognitive and brain functions. This story begins not with a special interest in nutritional effects on brain function, but instead with an interest on stress and arousal effects on memory. And I will work my way to sugar from that in a moment.

The important message here is that when two very different fields begin to come to the same conclusions from entirely different perspectives, it lends additional validity in each of those fields.

Well, I wanted to say two things before going through my remarks. One is that most of my research has been on brain mechanisms that control the formation of new memories. That research is mainly on rats and mice, not on humans. I'll describe just a bit of that information today. But I will instead focus on my laboratory's research on human subjects.

Second, in humans—perhaps making it even less interesting to this audience—the research that my laboratory has done has examined the effects of sugar on a wide range of populations, but only a bit on schoolchildren; primarily, in fact, on healthy elderly subjects. Those will be the results I will talk about.

On the other hand, I do think that the breadth of results across species and across ages within a species reveals some basic rules about nutrition and brain function that do apply to education programs and to school breakfast and other meal programs.

Let me begin by explaining the relationship. Imagine yourself in the following story:

You look out an office window at a parking lot below and see this car smash into that one. Your car is the one being hit.

You see that the door of the moving car is open and the driver is looking back to see how bad it is. And it's bad. Then the driver closes the door and leaves very fast. You are likely to remember very well a lot of the details of that experience, what color the other car was and important information of that sort, but also really minor information, such as who called you 20 minutes earlier and delayed your departure so that, if only that call hadn't come in, your car wouldn't have been there.

This is a memory that I think is promoted by the emotional reaction to this event. Compare that memory with memory for the same scene, but just described a little differently. Your car is still in the same place. But now the driver of the other car is backing up very slowly with the door open, looking back to avoid bumping into your car, and then he or she drives away.

You're likely not to remember that event at all. A couple of weeks later if someone said what was the color car that you saw last Tuesday backing up toward yours, you would go, "What car?" You wouldn't remember it at all.

The information that came into your sensory systems was identical. It was the emotional value that was very different. And that emotional value is what my laboratory has tried to turn into biological responses to understand how those biological responses regulate the way and the amount of memory formation in the brain.

Now, I'm talking about rats first because, historically, this is the direction from which the research began. In rats, we teach them an experience that is a very minor experience, a bit like watching one car back up slowly toward the other. Then we specifically adjust it so that the memory is not very good. With a saline control group, we inject one of the hormonal consequences of having a more intense experience.

The emotional consequence that we inject is epinephrine which is exactly the same hormone as adrenaline. We find that adrenaline at different doses enhances memory measured later on for that very same experience.

At intermediate doses, that would actually match how an individual would respond to an emotional event, we see improved memory for an event that really is minor. We know this to be true already in the context of flashbulb memories.

Thinking back to the car example, remembering minutiae of the moment is something that would happen, as well as remembering the key features of that event.

The big issue then becomes why adrenaline improves memory. The reason why that has been a difficult issue is because adrenaline does not enter the central nervous system. The body has a remarkable capacity of keeping the circulating adrenaline out of the central nervous system because the brain is going to use adrenaline for other purposes. So the brain is protected from circulating adrenaline used as a hormone.

How does the adrenaline affect the brain, which is, of course, where we think the memories are formed? Summarizing a lot of effort over a long period to understand how epinephrine works, one of the key physiological responses to epinephrine release is the release of glucose into the circulatory system. That's how we get to sugar.

Now, I'll describe a study with glucose instead of adrenaline. The experiment uses the same learning situation in rats. And once again, peak memory is seen at concentrations that correspond to the increase in glucose that one would see in the rats given adrenaline.

Now, glucose is very different from adrenaline in that glucose *does* enter the central nervous system. The brain feeds on glucose. In fact, while the brain makes up only 2 percent of the body, it uses about 25 percent of the glucose. So maybe there is something to be said for losing weight by thinking a lot about it.

For the brain and not for other organs, glucose is pretty much the sole source of energy. I'll have more to say about the brain's need for glucose toward the end of this presentation.

As I mentioned, I've been interested in age-related memory loss. And it turns out that in rats and mice, just like in people, there is age-related memory loss, which we attribute in part to loss of neuroendocrine responses and loss of the glucose response to experience. Those studies show that glucose indeed does improve cognitive functions in aged rats and mice.

One of the key aspects of this work is that one can generalize, remarkably easily I think, from tests of rats and mice to testing effects of glucose in humans and other animals. The results seem to be entirely compatible.

Unlike adrenaline, glucose is a very safe treatment. We began a series of studies in humans to see if glucose would improve cognitive function. Healthy 70-year-olds make up the subjects in most of the studies that I will be talking about. I will mention it if that's not the case.

At the beginning of this research program with human subjects, we still were not interested in nutrition or in breakfast. But for experimental design purposes, we wanted to control what else the patients were eating at that moment. The easiest way to do that was to ask the subjects not to eat or drink for a long period of time before the experiment. The easiest time to do that, of course, is while they were asleep.

So we would give subjects the instruction, "Don't eat or drink after bedtime," and then we would test them first thing in the morning. They were happy to comply. So the typical protocol used for testing glucose effects on memory in humans turned into a breakfast study.

The subjects come in early in the morning. Baseline glucose measurements are taken. They then have their breakfast or manufactured breakfast, which is unsweetened lemonade prepared with either glucose or, as a control, saccharin.

These are acute studies. This is very different than the studies by Dr. Grantham-McGregor and Dr. Kleinman who spoke earlier, which are chronic studies and, I think, should have more impact on social policy.

These are acute studies: what happens on this that day if you have glucose or not.

In most studies, the subjects come in twice. On different days, they receive either glucose or saccharin. Then we wait for the blood glucose to rise and give a variety of cognitive tests. We take blood glucose levels through the rest of the experimental session, which typically lasts for about one hour.

One of the tests that we've used the most is a test of a narrative prose passage—a short story--from a standardized test developed by Wechsler years ago. The subjects hear the short story and then, at a later time, they are asked to freely recall everything they remember about it. It's a free-form test.

Their responses are transcribed, and then we look at the number of items of information that they remember. This, then, is a test of memory. They hear a story, and then they answer later on at 2 times, either 5 minutes or 45 minutes later, "What do you remember of the content of that story?"

Here are some of the results. About two-thirds of the subjects are women. Partly, that reflects the demography. But it also reflects the fact that the husbands don't want their memory tested. They will drive their wives in and sit in the car, but they won't go in and let us test their memory.

Each subject serves as his or her own control. So zero would be no effect at all. The blood glucose levels corresponding to an inverted-U dose-response curve actually peak at almost exactly the same peak that we would see in rats. I don't know yet whether that's a coincidence or a biologically meaningful comparison.

Results are similar for some other tests, as well. The improvement of memory for the prose passage is about a 40-percent increase in the number of items remembered for that prose passage, comparing each subject's performance on a glucose vs. saccharin treatment day.

We've also looked at people with cognitive pathologies. One of the pathologies that we've looked at is Alzheimer's disease.

We designed the study the same way as before, with a counter-balanced cross-over design. Subjects would get either glucose or saccharin and then the opposite treatment on a different day. It's even more important with Alzheimer's patients to use each subject as his or her own control, because there is such a huge range of capacity in these subjects.

Now, for Alzheimer's patients, the tests were actually reduced versions of the tests that we had used in healthy elderly subjects. The reduced versions were necessary because these patients were low functioning. So they had to have simpler tests in order to have any chance of our seeing performance at all.

The results are recorded as percent change within each subject. With respect to the prose passage--a short story, but a shorter version of the one I showed earlier--there is a 100 percent improvement. That means the scores doubled on the glucose day compared to the same subjects' performance on the saccharin day. I think this is a truly dramatic effect on cognitive function in these subjects.

To give you some real perspective though, consider the same data presented differently. There is a doubling of performance between the saccharin and the glucose performance.

One hundred percent is what we would expect of healthy 70-year-olds. Even with a 100 percent improvement, there remains a very large deficit on the glucose days compared to healthy 70-year-old controls.

Well, let's leave the elderly subjects and pathological subjects, and talk about undergraduate students at the University of Virginia. We had used undergraduates, throughout all of the

experiments in healthy elderly subjects, as controls for the age effect. We had never seen a glucose effect in those subjects.

Then, Donna Korol in my research group noted that the reason for that might be that the tests were too easy. They are meant to show age-related memory loss. They might be too easy for the college students.

So what she did was borrow and then develop some tests that were harder. The prose passages were longer and more complex, far more intricate, with many more items to be remembered.

Another test included is an attention test, the Minnesota Clerical Test, where you put a check mark if the first number is the same as the second number. These go out to many, many digits; you have pages and pages of these to finish. The key item is how many of the pages you finish. This, too, is a standardized test.

For both of these measures, one of memory and one of attention, we see significant and substantial improvement in college students on memory for the prose passage as well as marginal effect on the attention test.

There are a couple of important things here. One is that these are high-functioning individuals. There is no reason to think that they are nutritionally disadvantaged. Another main point is that the effect size is really remarkably large. That is, my students would very much like to say that they could do something as easy as drinking lemonade to get a 30 percent improvement on any test I would choose to give them. This is a substantial improvement.

Let me go back now to healthy elderly. As an example, one subject was a woman of 78. Our studies are conducted in the morning before breakfast, so 7:00 a.m. is a typical time. In the summer in July in Charlottesville, Virginia, it is very hot. This woman ran in to her sessions from her home three miles away. Then we would test her and she would run home again.

The point of the experiments coming is that we're trying to get a little more ecological validity in them and look at real breakfast instead of just the glucose drink alone. We recruited healthy elderly subjects to come in and have an honest-to-goodness breakfast at our behest. As before, we would then test their cognitive functions.

The breakfast cereal with skim milk in it was matched so that the blood glucose responses are identical basically for those subjects who got glucose and those subjects who got the real breakfast. One of the tests that was added into this was a measure of creativity. The creativity test involves having someone ask you to list, for example, all of the noisy things you can think of, or think of all the ways you might use a cork. And there are two parts to this. One is just how many words do you generate. As you saw in the last speaker's presentation, some of the children generated a lot of words after breakfast.

In addition to the number of words generated, the other, creativity part of this test is how many unusual uses you generate compared to everyone else. So at the end of the experiment, you

look for how many items this subject produced that no one else did. Actually, you work out the probability of other subjects coming up with the same words. And that's the measure of creativity.

The findings of this experiment showed that, in this healthy, elderly population, a breakfast of cereal resulted in a very large increase in this creativity measure.

Now, let me say something about the single experiment my laboratory has conducted with schoolchildren. We had wanted to look directly at the effects of breakfast in this very same manner, the effects of glucose in the performance of schoolchildren.

That was made difficult primarily in terms of getting permissions for children to do either of two things: One, delay breakfast until the children got to school—but no one would let us tell children not to have breakfast that day, a wholly reasonable response; or Two, do the experiments in the children's homes. The parents didn't want us there for breakfast in the morning. So we couldn't go into the homes.

So we tried to come up with a design that would let us ask the question. The experiment did not work. I think part of the reason that it didn't work is of interest.

What we did was deliver a standardized breakfast the night before testing for all the children in the study to eat on the next morning. So we at least controlled what they ate for breakfast. What they got was premeasured cereal and some juice. They would add their own milk to the cereal which was, as you'll see, probably an unfortunate decision.

These children then would have their breakfast at their usual time and go to school. With the change in design from earlier experiments, the reason for doing the experiment changed to one of seeing how the children would perform late in the morning when they might otherwise be hypoglycemic.

The main point is that the meal at 11:00 in the morning had no effect on performance, partly I think because the children had had breakfast that day, and they may already have been at optimal levels.

More than that, we had not worried enough about meal-meal interactions. The fact that they had fat in the milk at their breakfast blunted the glucose response to glucose given at 11:00 in the morning. I think meal-meal interactions are a very important part of what we need to worry about in worrying about meals at school.

Dr. Pollitt mentioned that we need to know more about what the meals are doing to the brain. I will describe an experiment that attempts to do that. It involves a rat in a maze used for memory testing. A tube is actually attached to a dialysis probe in a part of the brain called the hippocampus, involved in learning and memory.

With that probe, we can measure the glucose available to the neurons in the brain area involved in learning this task at the same time that the rats learn the maze and receive, or do not receive, glucose.

First, glucose administration improves memory in this task, as you have seen in other tasks. The important new part of this experiment comes next. In control animals, while they are being tested learning the maze, brain glucose levels—in that one brain area and not other brain areas—plummet by 30 percent and recover mainly after the learning event is over. In contrast, the subjects who got glucose and whose performance was improved benefited from that also in preserving the glucose levels available in that part of the brain.

This I think is clear evidence that breakfast and meals more generally can provide the brain with materials that it will otherwise deplete in the course of learning and memory. The control rats reveal, I think, a natural deficit model of learning and memory.

Let me say something about the implications of this work for school breakfast programs. I really do mean that these are implications and I am loath to call them recommendations. One is that cognitive abilities might be expected to be optimally enhanced by breakfast, and particularly by a breakfast with a sufficient carbohydrate load to elevate glucose for several hours.

The implication here is that sugar content, or at least carbohydrate content—and it will be important to talk about the whole mix of the breakfast, of course—may be an important component of the breakfast plan.

Second—and this is a topic that I think deserves far more attention than it has had—is that appropriate snacks including moderate carbohydrate content might be incorporated into the school day so that small meals are interspersed throughout the day in a manner that means brain glucose reserves will not be depleted by complex tasks.

A further implication is that the school plan might be organized to take advantage of those times in which the brain has all the glucose it might need. Thank you.

Introduction of Roscoe Dykman, Ph.D.

DR. ANAND: Our next speaker comes from the Children's Nutrition Research Center in Arkansas. He is Roscoe Dykman, Professor of Psychophysiology in the Department of Pediatrics at the University of Arkansas and the Arkansas Children's Hospital.

Over the years, Dr. Dykman has been involved in experiments in conditioning and genetics; research with children who are learning disabled and/or hyperactive. He is now studying the effect of growth retardation on psychological and physiological functioning in children. He is Director of the Brain Function Laboratories within the Arkansas Children's Nutrition Research Center, which is part of our sister agency, ARS, or Agriculture Research Service.

Dr. Dykman has authored some 200-plus scientific articles in the field of psychophysiology, behavioral genetics, attention deficit disorders, and learning disabilities. Please join me in welcoming Dr. Roscoe Dykman. He will speak on infancy to adolescence, the long-term effect of nutrition on growth.

Presentation by Roscoe Dykman, Ph.D.
Arkansas Children's Nutrition Research Center

Infancy to Adolescence: Long-Term Effects of Nutrition on Growth

Roscoe Dykman, Ph.D., Arkansas Children's Nutrition Research Center—After hearing the wonderful talks on the effects of school breakfast and glucose, I am just wondering where my shot of glucose is.

We are doing many USDA studies that I will not talk about today. We are looking at the effects of school breakfast, soy, and various glyconutritional supplements on brain functioning. In the school breakfast study, we are recording magnetic images from the brain with a device called SQUID (superconducting quantum interference device). Our brains are always active whether we are asleep or awake. Activity in any region of the brain means that countless neurons are generating electrical activity, which can be recorded by electrodes on the scalp. This electrical activity also produces magnetic fields, which the SQUID can detect and localize without any physical contact with the head.

I am going to talk today about the electrical potentials recorded from electrodes pasted to the surface of the head. These are recorded by an electroencephalogaph (EEG). During sleep, we go through different stages at different times of the night, and it is possible to determine the stage of sleep a person is in by his or her patterns of electrical activity. The brain lives in a house with different rooms, and it spends some time in each room every night. There are also different levels or stages of wakefulness: alert but quiet, sleepy, and attending to or shutting the environment out. It is difficult to see the effect of a stimulus, say a single tone, because its effect is hidden by everything else going on in the brain at the time of presentation. We say that the stimulus is concealed in the noise. The important background activity is called noise only because it hides events we wish to see. Fortunately, one can eliminate much of the noise (background activity) by the simple technique of averaging over many repetitions of the stimulus (trials). The average response is called an event-related potential (ERP), and it reveals what the brain does electrically from the time the stimulus is presented until it is analyzed and stored in memory.

The ERP has many different waves, the early ones reflecting sensory intake and the later ones cognitive processing. From what we have already heard this morning from Dr. Gold and others, it is evident that our brains become more alert with food consumption or caffeine. I am going to report evidence one step removed from the direct-challenge studies of previous speakers; namely, the long-term consequences of growth retardation early in life. I will discuss two studies of children (ages 8 to 15) who were diagnosed as "Failure to Thrive" (FTT) before the age of 3. Inadequate nourishment is the best guess as to the cause of the growth problems of these children.

Behavioral and ERP data will be presented for each group of subjects. Most important, these studies suggest that the early growth/nutritional problems of these children have altered in subtle ways the functioning of one of the most important areas of the brain, the frontal lobes. This large area located in the frontal part of the head plays a very important role in the planning of motor movements, decision-making, emotional responses, and speech. There is a special area in the

frontal lobe called Broca's area, which is known to be especially important in the expression of language speech). If you were a mailman with damage to Broca's area, and were asked your occupation, you might say something like, "Mail — mail ah — mail," but not be able to say mailman. But you would understand the question and know what was requested. The understanding of speech depends upon areas further back in the brain.

The frontal area of the brain has many other important functions such as focusing and sustaining attention, decision-making, and the judgment of the possible consequences of our actions. It plays an important role in the inhibition of actions and in delay of gratification—delaying now for a greater reward later on. Injuries to the frontal lobes may result in a person engaging in antisocial acts with few feelings of guilt.

Now, I'd like to discuss the results of two specific studies. The research we have underway and the research I am reporting today could not have been done without the support of the ARS division of USDA, and of Dr. Thomas Badger, the director of our nutrition center.

Two groups of children were involved in the two studies. Subjects in the first study were younger than those in the second study: age range for the first study was 8-12 and for the second, 9-15. Remember that all of these children were diagnosed as FTT before the age of 3, and that the FTT label implies significant retardation in physical growth, with malnutrition presumably the most important underlying cause.

The first study on the younger group was done before we had a site visit, and the second, on an older group (9-15), was done after the site visit. The site team consisted of distinguished USDA personnel and well-known researchers from various universities. They suggested a number of protocol changes, which slowed our progress for several months. Differences in the two studies represent the impact of the site visit team.

Fortunately, the two studies had many common measures, as follows: anthropometric, IQ, school achievement, mother's IQ, and the Child Behavior Checklist (CBCL), which an earlier speaker also used. The CBCL is a well standardized and widely used rating scale with a version for parents and another for teachers. We only used the parent form. The CBCL assesses various behaviors such as inattention, aggression, delinquency, anxiety, depression, etc.

The two groups of subjects received different laboratory paradigms. In both, we were studying event-related potentials (ERP's). As I told you earlier, the purpose of an average is to get a clearer picture of the response of the brain to a given event. Averaging trials allows one to see what the brain is doing in successively small increments of time; e.g., every 1/200 of a second.

Failure to thrive is a term used by pediatricians to describe babies and toddlers with growth problems. And generally, they are less than the 5th percentile in weight norms and less than the 10th percentile in height and weight for height norms (a ratio of weight to height). Now, remember that I'm talking today about kids who were diagnosed as FTT before the age of 3. Generally, pediatricians recognize three categories of FTT: 1) an organic category resulting from disease or genetics; 2) a nonorganic category resulting from environmental factors such as poverty, and/or inadequate parenting; and 3) a mixed category involving both organic and nonorganic factors. Our study excluded the organic and mixed conditions. The group that I will be talking about today is

the one labeled NOFTT (nonorganic failure to thrive). It is presumed that these children have no known organic conditions to explain their growth problems. However, there could be factors not known having to do with appetite, the efficacy of their digestive processes, and, I think, most likely subtle differences in the functioning of central neural structures regulating nutrition.

In the first study, the clinical group (those diagnosed as FTT at an early age) was not statistically different in age, sex, race, or socioeconomic status (SES) (latter measured by the Hollingshead index) from controls. Marginally more FTT subjects lived in one-parent families. Mothers of FTT subjects had a lower level of education than those of controls. But IQ scores were not different for the FTT or control mothers despite their differences in education.

In comparing the 8- to 12-year-old FTT subjects with controls--the number with a height percentile less than 20th and a weight percentile less than 20th--the FTT subjects were smaller than controls on both measures. Both of those measures were statistically significant

Group differences on the body mass index, and body mass z-scores, were also statistically significant, along with IQ, reading, spelling, and arithmetic. Clinical subjects had lower scores on all these measures than controls. Also FTT children as a group had higher externalizing scores on the Child Behavior Checklist. This score is a combination of three scales: aggression, inattention, and delinquency.

With respect to overweight children, it was somewhat surprising to find that in the sample as a whole, overweight children, whether controls or FTT, had lower IQs and lower SES scores than those not overweight. Twenty-five percent of the controls and 20 percent of the FTT subjects were overweight; i.e., greater than one standard deviation above the mean on body mass index scores.

For the laboratory test, we used a modified version of a test first developed to assess the vigilance of radar operators at airports. The simplest version of the test often used with young children is to tell them to press a reaction time key every time they see the letter X, but not to respond to any other letter. You can see that this would get very boring after a few minutes. We used a more complex vigilance task known as the AX version. Our subjects were told to press a reaction time key when the letter X appeared, but only if it followed the letter A. Letters flashed once every 3 seconds. Exposure time was 1 second for all letters.

If you were a subject in this experiment, you would see a string of letters like ABCKAXG and so on. For the X that followed the letter A, you should have pressed the reaction time key. The X is called a target when it follows the letter A. You should ignore other stimuli referred to as standards, which are letter strings such as BZKLOP (no X's or A's). Occasionally, you would see A's followed by letters other than X. These are called false targets. Finally, you would see X's preceded by letters other than A's, another type of false target.

It is instructive to look at this paradigm in another way; namely, one with many no-go stimuli and few go stimuli. The no-go condition is thought to involve inhibitory neural circuits. The subject sees a stimulus and decides not to respond. This decision may be semiautomatic (made largely out of awareness). Even so, it produces an ERP; the brain is responding even though the person does nothing. There are different degrees of inhibition. The brain response to standards is

different than the brain response to false targets. Note, also, that the false targets produce a response that is larger than the response to standards, but not as large as the response to targets.

The important thing here to realize about false targets is that the kids were not actually making very many false responses. But their brains responded to these trials in a different way than to the other stimuli.

In this experiment, we didn't find any differences between FTT subjects and controls in responding to targets or standards. But we found a large and statistically significant difference between the two groups in their ERP's to the false targets. The difference is only in one wave (one part of the ERP) known as the late component (latency in the 600-700 millisecond range). This particular wave is generated by the frontal lobes. The control group had greater positivity in this wave.

Now, let's consider a response generated in the back part of the brain. It is called P300 (latency in adults is 300 msecs, but it is longer in children). This is sometimes referred to as the oddball response. It occurs when there are two or more stimuli with one of them presented at a much lesser frequency than others; e.g., the AX condition in our experiment. Subjects are generally told to note or respond to the oddball stimulus (targets) in some way. While the targets in our experiment (the X's that followed A's) did not differentiate FTT and control subjects, it did result in a huge P300 wave. This response is prominent over central and parietal areas, which suggests that any deficiencies in information processing that FTT subjects might have are not in the back part of the brain.

The laboratory part of the study was done on a slightly larger group of the younger children than was reported for the demographic and behavioral data above. In that report, we matched children for SES. In this study, we matched for IQ. The net effect is that we lost more subjects when we matched for SES than when we matched for IQ. For the laboratory study, we had 25 FTT children and 42 controls. The controls were divided into two IQ groups, low and high, with the low group matching the FTT group. We were looking for a close matching on intelligence as assessed by the Wechsler Intelligence Scale for Children (WISC III), believing that IQ would bias the ERP.

Now, going to the second study of the older children, we had 40 FTT subjects, (24 boys, 16 girls) and 21 controls (12 boys, 9 girls). Of the 40 FTT's, 27 were white, 13 black; of the 21 controls, 11 were white and 10 were black. SES means did not differ statistically for controls and FTT subjects.

Regarding the BMI index for these subjects, only 25 percent of the controls were below the 20th percentile, whereas 51 percent of the FTT children were below the 20th percentile. This was a highly significant difference. And the most consistent finding has been the stunting of FTT children, as they grow older. A significantly greater percentage of FTT children in both studies were below the 25th percentile in height.

The most important difference we've found so far in our studies shows up in the standardized scores in reading, spelling, and numbers on the Wechsler Achievement Test. The average score should be about 100 for each of these. Note that the FTT girls are about the same as the control girls. But FTT boys are at least 1 standard deviation below 100 in reading, spelling, and

numbers. Control boys had lower scores than the FTT or control girls. We have no explanation of these huge discrepancies, except that it is known that childhood diseases have a greater impact on boys than girls. There are more developmental defects of almost every kind among boys than girls.

Now, the paradigm we used in the laboratory involved language and not vigilance. Each child received a total of 180 trials: 6 different types of trials with 30 repetitions of each. One type of trial involved first- and second-grade words like "book." Book could be followed by: 1) a rhyming real word (cook) or a rhyming pseudoword (mook); 2) a nonrhyming word like "bird" or pseudoword like "bord;" or 3) a string of letters or the same word, book.

Now, I'm going to tell you about only two of these today—a word followed by the same word or a word followed by a string of letters. This is more difficult than it seems at first glance since all word and letter pairs occur in random order, and the letters only occur on one-sixth of all trials. We don't have enough subjects yet to be able to look at all of these separately or in relation to each other.

This task is called a lexical decision task. There are two keys adjacent to the subject's dominant hand. He or she is told to press "yes" if the second stimulus is a real word and "no" otherwise.

As to the demographic, there were only 13 FTT subjects compared with 14 controls, which in the ERP literature is a decent sample size. But it's not anything like we hope to get before we complete the project.

It is important that groups have about the same number of trials in computing ERP's; otherwise difference in averages might only reflect difference in the number of trials. It is also important to match groups on the number of correct responses. Generally, clinical subjects tend to pay less attention and have more movement artifacts than controls, which results in an unequal number of trials in the two groups. This difference is important in its own right, but it invalidates a direct comparison of ERP's. In this study, we equated the two groups, FTT and controls, for an equal number of correct responses and trials. This reduced the number of subjects we could study. We also matched groups for SES, IQ, and achievement (reading and spelling) scores. Hence, any differences obtained in ERP's cannot be attributed to variations in the number of correct responses, artifacts, or to differences in IQ language skills.

Our most consistent finding was that FTT children were much, much slower in responding to words and letters than the controls. It took them a lot longer to decide whether a given real word stimulus was, in fact, a word. Thus, the effort required to make this response appears to be different in the two groups.

We recorded event-related potentials from 10 different brain areas. But as I told you, all our significant findings were in the frontal area and very few of them in the back part of the brain. The areas of the brain where the most important differences occurred were the frontal lobes located in the front part of the head.

I want to explain the N400 response to letters. N400 occurs to any kind of verbal anomaly in a sentence; for example, "The car was driven over the cloud," or the letter strings in our task.

The mean N400 wave is much larger in the FTT group than in the control group. We took this to mean that it was more difficult for FTT subjects than controls to decide whether the letter string in this paradigm was not a word. The N400 peak is slower to develop in FTT subjects, and, as already noted, this was also true for their reaction times.

As for the responses to words, the FTT subjects had a huge N400 response. Controls were able to use the first word as a priming stimulus in making a response to the second word. FTT children are less able to use that first word as a priming stimulus in making a response to the second word, even though it is the same word.

Another interesting finding is the bigger response of the controls to a wave occurring at about 500 milliseconds. This response was related to reading skill: the larger this component, the better the reader. Again, all the significant differences occurred in the frontal lobes.

The only hemispheric difference occurred in the early P250 (P-positive and 250-typical latency in msecs) component. The right hemisphere was dominant over the left in FTT subjects but not in controls. The neurological literature indicates that there is a shift from right- to left-hemisphere processing as children become more efficient readers. Our data suggest that controls use both hemispheres in rejecting letter strings as words. FTT's are more right-hemisphere dominant in rejecting letter strings as words, and they appear to be less efficient in left-hemisphere processing.

Now, N400 has been widely studied. It is a component of ERP related to verbal incongruity. Again, it is larger when a word stimulus is perceived as anomalous in the context in which it is presented. We have studied N400 in dyslexic subjects. The subjects were asked to decide whether the second word sounded like the first one; that is, whether it rhymed with it or alliterated with it. And N400 is smaller to the second word if it sounds like the first. Dyslexic children have larger N400; that is, less recognition of the similarity of rhyming words.

This current ERP study suggests less automated word recognition among children who were diagnosed as FTT before the age of 3. Supporting evidence is as follows: the FTT group has slower reaction times and failed to show a priming effect in the N400 to words; that is, they couldn't use the first stimulus as a guide to helping them respond to the second stimulus. Also, the FTT group had a larger N400 to letter strings, suggesting a greater effort in recognizing these stimuli as nonwords. And the control group had a larger response to the P500 component to words, which was related to reading ability.

I want to just say one other thing. Both studies I have reported today support the fact that FTT children were behind in cognitive skills, and in the three different growth measures (height, weight, and the BMI ratio). Thank you very much.

SCIENTIFIC QUESTION-AND-ANSWER SESSION

DR. ANAND: Thank you, Dr. Dykman. Now, this is a chance for our audience to comment or ask questions. Please line up at the two microphones on both sides. The only request is that before you ask a question, please identify yourself and your organization. And if you have a question for a specific speaker, please address that person.

QUESTIONER (food and nutrition consultant in Washington): Dr. Gold, could you please clarify the following: Does a high carbohydrate breakfast then produce the same improvement in cognitive functioning in humans that glucose had in your human subjects? Did you compare a high carbohydrate breakfast, for instance, to high protein or high fat? Is the important factor carbohydrates or is it just calories?

DR. GOLD: I wish I knew the answer to those questions. We have not done direct comparisons of different kinds of breakfast or even different breakfast compositions. Even in the case of the one true breakfast that we've used in comparison to glucose, the tests aren't exactly the same as used to look at effects of glucose. So direct comparisons are not yet available.

The only thing that approximates that is the evidence that, in a situation in which the breakfast has a high-moderate fat load, that will blunt the glycemic response. And that's associated with a failure of glucose to improve cognition. So that's the closest I can come to a direct answer.

DR. ANAND: Any more questions, comments? The microphones are available. This is your chance to ask questions or comment. Please go ahead.

QUESTIONER (from the University of North Florida): Hi, Dr. Pollitt. I am a graduate student in psychology. I've read a lot and I also run an after-school feeding program for underprivileged children living in the inner city. I'm interested in looking at nutrition and cognition and learning.

Specifically, in a study that I just read of yours, you mentioned a U-shaped link indicating that there might be similar relationships between nutrition and cognition in young children and in elderly adults.

Is that what you were talking about in identifying populations who may be more at risk? And then also, I believe some of your current research has to do with temperament and its effects in the nutrition-cognition link. Is that also what you're talking about? I guess I'd like some clarification on what sort of populations you refer to and what you're looking for.

DR. POLLITT: In connection with the first part of your question, I think you're referring to a paragraph that is part of the paper that was an integrative review of the papers presented at our meeting in Napa, California, on breakfast. That was not an empirically based U-shaped curve. It was introduced really as a hypothesis.

In connection with what I mean by identifying populations at risk, there is information that we don't have. And that is what are the moderating factors of the relationship between, let's say, not taking breakfast and performance.

For instance, we don't really know what the difference is between a 7-year-old and a 10-year-old, and between a 10- and a 13-year-old who are really at different stages in growth and development. We need information like that.

There is another piece of evidence which is tremendously interesting and important, for example. If you looked at the literature on the effects of omitting breakfast on performance, you will see that most of the data which actually shows an effect on middle class children comes from low-income countries.

In the United States, it has been shown that the effects of not taking breakfast occur in the middle class child. For example, in studies that I have done in Cambridge, Massachusetts and in Texas, we documented that effect with completely normal middle class children.

However, both Sally Grantham-McGregor and I, for example, she in Jamaica, I in Peru, did not see an effect on middle class children in low-income countries. We did see an effect on undernourished children.

What I am suggesting is there are three variables that are entering into play: One is probably nutritional status; two may be the individual history that the children have in terms of how often they have breakfast; and three is socioeconomic status.

So it is important to look at the nutritional status of the child, such as stunting or iron deficiency anemia, in connection with how vulnerable they are in not taking breakfast. That's what I'm talking about.

DR. ANAND: Please go ahead.

QUESTIONER (USDA): Did any of you who were manipulating breakfast as a variable look at the incidence of illness or infection and whether that changed?

DR. KLEINMAN: No. The only thing that we've done is look at visits to the school nurse. But we all know that doesn't always indicate illness.

DR. ANAND: Go ahead, please.

QUESTIONER (D.C. Public Schools Head Start Programs): Thank you. Dr. Grantham-McGregor, two brief questions. How young were the children in your study? And looking at social-emotional development, are you planning to do a study that impacts that?

Because Head Start's family-style feeding program here in the United States supports the social-developmental aspect, as well as being modeling for young children. Our children are 3 to 4 years old. How young were the children in your study and what plans do you have?

DR. GRANTHAM-McGREGOR: In the breakfast studies, the youngest child was 8. In the very last study I reported, ages ranged from grade two to grade five. The youngest, grade two and grade three, were the ones who benefited and not the older children.

I had planned to do a study on breakfast, but the money has been removed. So I am looking for money to do it. But we certainly see in undernourished children a change in social and emotional development that probably deserves more attention, certainly in the younger children.

We have a study in Jamaica, on stunted children, children who were short, which may be fairly like the failure-to-thrive children here. I'm not sure. They show behavior problems through to 12 years of age. They were stunted in early childhood. They also show differences in stress response to a stressful situation. You know, like different cortisols and heart rates.

So I'm sure nutrition and emotional development are linked. And I don't think we've done enough work on it. I certainly think it's an important topic.

QUESTIONER: Thank you.

DR. ANAND: Before I take this next question, I would like to announce that there will be a similar conference sometime in June on the role of the school environment in promoting healthy eating behavior in children. Please watch our web site for the date, time, and the number of speakers who will speak at that one. Please go ahead.

QUESTIONER (dietitian in the Hartford public schools): Good morning. I have two questions. One, the USDA healthy meals initiative recommends about 554 calories for breakfast and we're averaging about 400 to 450 for our breakfast in Hartford. Does a lower calorie intake impact any of the positive effects of breakfast?

My second comment is that many of us here are involved in school breakfast programs and know the benefits already. Is anyone on the panel willing to present to school administrators to show them the importance of school breakfast?

DR. ANAND: Dr. Kleinman?

DR. KLEINMAN: Absolutely. I would be happy to work with you if I could be helpful. Your first question—and I think everyone else can try to answer that, as well—I don't think we know what it is that causes the relationship between performance and taking breakfast. So it's very difficult to answer your question as to whether calories or carbohydrates or any of the micronutrients in the breakfast are really what's important.

Then, of course, there are all the other factors that come in. For example, how often the child snacks during the day and the child's nutritional status in the first place and glycogen reserves and things like that. So it turns into a very complex question that ends up needing quite a few studies to get answers.

QUESTIONER: Thank you.

DR. POLLITT: I would like to add a comment to what Dr. Kleinman just said. That is, after listening to Dr. Gold, I have the impression that the relationship between glucose and performance is well established. That really has not been my experience.

I have participated in five highly controlled experimental studies on breakfast and performance. And in these five studies, only two of them showed a relationship between glucose and performance in a series of tests. I can also cite, for example, literature from Rogers in the United Kingdom which has not shown this relationship.

So I just want to caution the audience that this is not an established relationship that we all accept. At least, I don't read it in that way.

DR. GOLD: The experiments you note are very different from the many, many demonstrations of glucose effects on cognition. The list of successful demonstrations of glucose enhancement of cognition is very long in both humans and other animals. But those experiments are qualitatively different from the experiments that others of you have done. The successful demonstrations are, pretty much without exception, experiments that look at the effects of an acute breakfast; that is, the effect of the breakfast on performance that day. Also, most of those experiments administer glucose as the sole nutrient of the "breakfast." Finally, most successful demonstrations of glucose enhancement compare performance of the same subjects under two conditions—glucose and nonglucose days.

As to the long-term consequences of breakfast where long-term may only be a month or two, that's a very different issue because you begin to get into many other aspects of nutrition. I don't want for a moment for the message to be taken away that, if you just eat sugar for breakfast for life, you will be doing yourself a favor. That's not the case.

In a chronic setting, we have to be much more concerned about overall nutrition. And I do think carbohydrates will play an important role in that, but not be the sole determinant of the effects on performance in school settings.

DR. ANAND: Please go ahead.

QUESTIONER (registered dietitian at the Louisiana Cooperative Extension with the Food Stamp Family Nutrition Program): Just a quick question. I am directly involved in community education.

I was fascinated with the science that has been presented here today regarding breakfast and cognition. I am hearing from my field that getting the students to actually take the breakfast is a big problem. And I was interested in a little more information regarding the success you had with destigmatizing the breakfast-lunch program. How else can we encourage our families to participate?

DR. KLEINMAN: I think one of the issues that leads to stigma is when it's identified as a feeding program for some selected group of kids within the school. So if you say I'm going to put a feeding program in, a breakfast program in, that's for poor kids, that's a pretty rotten thing to do to that group of kids.

On the other hand, if you put a program in that's universal, where every youngster gets that breakfast regardless of ability to pay, and if the school needs to collect some money for that, it's done in a way that's income blind, for example, a card system, then there really is no stigma.

I think most of us have had experience of being singled out. We don't like it. So there are easy ways to implement a breakfast and lunch program absolutely without stigma, and they are very successful.

DR. ANAND: Dr. Dykman, you had a comment?

DR. DYKMAN: I was just thinking that, unless you control for placebo effects in some of these studies, you've got a real problem because you can put kids on methylphenidate and kids on a placebo and some of the kids on placebo do just about as well for a month or so as the kids on the drug. You know, if you're treating ADHD (attention deficit hyperactivity disorder) kids, that placebo effect can be tremendous when people think they're getting something good. It's amazing what a positive effect that can have on the results of a study.

DR. ANAND: Yes, go ahead.

QUESTIONER (Block Dietary Data Systems in Berkeley, California): I have a question for Dr. Grantham-McGregor, but also for others, about the rather provocative finding that you found an impact on arithmetic performance, but not at all in any of your studies in terms of linguistic performance, reading, etc.

I was wondering if you or others might speculate on why: brain functions, something about the tests, whatever?

DR. GRANTHAM-McGREGOR: I wish I had an answer. I don't know. But arithmetic does seem to improve. I had a feeling that reading may be closely linked with the family background--how many books in the home, how much reading goes on in the home, and things like that. Perhaps it's more difficult to affect by changing the state of the child in the classroom. But that was only a suggestion. I don't know if anyone else knows.

DR. ANAND: Does anybody else have a comment?

PREVIOUS QUESTIONER: In your studies in Guatemala, you found an array of differences in terms of early nutrition. I wonder if you might comment on those.

DR. POLLITT: I don't know. Almost anywhere that I have worked, the effect is an outcome that is very difficult to explain. Of course, you can explain on the basis of educational level and what grade the child is, etc. But, if you hold constant educational level, and you have a set of background variables that you use as predictors, it is very difficult to account for a very significant portion of the variance.

I'm thinking of a study that we just published on the determinants of educational outcomes in the central Andean region of Peru. You can explain up to about 60 percent of the variance on reading comprehension, for example, or other verbal development tasks. When you go into arithmetic, when you go into coding, going up 25 percent is tough. That's my own experience.

DR. ANAND: Go ahead.

QUESTIONER (USDA): In my studies, what I've seen is that math is much more difficult, much more challenging, more arousing. I think under that more stressful condition, sometimes you see effects that you don't see under conditions that are less stressful for the individual.

Because of that other variable in there, unless you're measuring it in some other way, you don't have a way of accounting for it. But I think that's why you see that effect sometimes in math and you don't see it elsewhere. It's a nice secondary stressor.

DR. GOLD: In addition to the secondary stress aspect, task quality and complexity are important factors seen in studies with rats. When rats are presented with a complex task, deficits in available glucose are seen in brain areas relevant for those tasks and are not seen in other brain areas. If the task is made simpler, then there is no depletion of glucose even in the same brain area. Also, glucose has no effect on memory for that easier task.

There is also another side to this issue. Complex tasks present an interesting interaction, because the more complex tasks likely are more stressful. That would raise blood glucose levels of course. At the same time, those are the conditions under which the depletions in the brain are most obvious.

DR. ANAND: Dr. Dykman?

DR. DYKMAN: I just wanted to make a point about the data that I reported. We've done blood studies of practically every nutritional element you can possibly think of: minerals, vitamins, you name it.

And the only thing that's showed up in this older FTT group that was significant was slightly lower albumin levels. It was statistically significant. But when you're looking at that many things, 30 or 40 different dietary elements, you might get one of them significant just by chance.

So far, at least, it looks like these adolescent kids, if you just want to look at blood levels, have fairly adequate diets. But nutrition studies in the home indicate some kind of discrepancy between the blood levels of what is measured when one actually looks at it in the diets of the children.

DR. ANAND: We have a very exciting panel this afternoon and you have been very patient listeners. I would like you to all come back at 2:30 when we will reconvene the second half of this symposium. Thank you very much.

AFTERNOON SESSION
POLICY IMPLICATIONS AND RECOMMENDATIONS

Introduction of USDA Deputy Under Secretary Julie Paradis

DR. ANAND: It gives me great pleasure at this time to present to you Julie Paradis, the Deputy Under Secretary of the Food, Nutrition, and Consumer Services. Many of you probably know Julie came to USDA after many years' experience on Capitol Hill. She is a great proponent of the food programs, and it has been a pleasure working with her. Julie Paradis.

Introductions of Glenda Humiston and Congresswoman Woolsey

DEPUTY UNDER SECRETARY PARADIS: Thank you so much, Raj. It's a real pleasure to be here. I was here through the morning session and found it really thrilling. Congratulations on a wonderful symposium.

And thanks for all of you who have stuck with us and come back for the afternoon session, which I think is going to be particularly stimulating and interesting. I'm only sorry that I'm not going to be able to stay and hear it. You'll have to give me a full briefing when I get back. I have a flight to catch in a couple of hours out of Dulles for San Francisco.

So, instead of being able to introduce each of the speakers just prior to their particular presentations, I'm going to depart from the normal procedure and do their introductions all at once before I leave.

In case you think I'm giving the symposium short shrift, I should tell you that I was in Colorado Springs yesterday and could well have flown to San Francisco from there, but decided that I really wanted to be here for the symposium. I flew back to be here at least for the morning, to be able to introduce our wonderful presenters for the afternoon.

I'm just sorry that that was all I was able to do today. But it's an important symposium. I know that you all share an interest in this important issue.

Unfortunately, Tim Coyle, who is the principal in Brownsville, Texas, let us know yesterday that he had decided, on reflection, that he needed to stay with his students through this week. Realizing the psychological impact of the events in Littleton on the kids in his high school, he was not going to be able to take the time off and come up here and be with us. I think he made the right decision.

So we have three presenters this afternoon. One of them is Mary Begalle, whom many of you may know. She has 17 years of experience in the administration of child nutrition programs at both the State and the local level. Currently, Ms. Begalle is Director of the Food and Nutrition Service with the Minnesota Department of Children, Families and Learning, and she is responsible for the administration of the food and nutrition programs in the great State of Minnesota.

Given what we've heard so much about this morning in terms of the research in Minnesota, we're very anxious to hear what Ms. Begalle has to tell us this afternoon. She has had experience in all aspects of administration, including budgeting and financial management, personnel management and staff development, facilities planning, and marketing and public relations.

Among her many responsibilities, Ms. Begalle is committed to the advancement of the School Breakfast Program, hence her participation this afternoon. She is a summa cum laude graduate of the College of St. Scholastica with a B.A. in dietetics. And she has done graduate work in management at the University of Minnesota at Duluth. Mary, we're delighted to have you with us this afternoon.

Also a presenter many of you know for her years and years of work in this field is Ms. Lynn Parker, the director of Child Nutrition Programs and Nutrition Policy for the Food Research and Action Center, affectionately known by many of us as FRAC. She is also President-elect of the Society for Nutrition Education.

Lynn played a leadership role in the development of the Community Childhood Hunger Identification Project, CCHIP, that we heard a lot about this morning. It was a groundbreaking survey of childhood hunger in the United States. And she has served a 5-year term on the National Nutrition Monitoring Council.

Lynn has also led the development of FRAC's Building Blocks Project, an effort to expand child nutrition programs as core funding for meeting the broader needs of children. Before coming to FRAC, she was a nutrition educator with New York State's Expanded Food and Nutrition Education Program, otherwise known as EFNEP.

She holds a B.A. in anthropology, and an M.S. in nutrition from Cornell University. Lynn, we're delighted that you could be here with us. You can come on up. You should be sitting at the table. Have a seat.

MS. PARKER: Thank you.

DEPUTY UNDER SECRETARY PARADIS: In fact, your name plate is right here. We are particularly delighted to have a member of Congress, one of our most ardent supporters, with us this afternoon. It is a great thrill. And one of my good friends here at the Department of Agriculture asked if she could have the honor of introducing the Congresswoman. I told her that I would be delighted for her to do that.

So I would at this time like to introduce Glenda Humiston who is our Deputy Under Secretary of Agriculture for Natural Resources and Environment. She was appointed to that position last July. She would very much like the opportunity to introduce Congresswoman Woolsey. Glenda?

Introduction of Congresswoman Lynn Woolsey

DEPUTY UNDER SECRETARY HUMISTON: Thank you, Julie. As a recent appointee, I must say that this job has its pleasures as well as its pains. And one of the pleasures is being able to occasionally prevail upon my colleagues for a little privilege such as this.

Before I exercise that privilege, though, I'm going to exercise one other. I was allowed 15 seconds for an advertisement. As many of you may have noticed during lunch hour, it is a beautiful day outside. As you leave here this afternoon, I urge you to go across into the Mall where you see five or six large white tents. We're celebrating Earth Day today and those tents are part of our agricultural Earth Day display.

Participating in the display are 30 agricultural commodity groups, as well as various Federal and State agency partners. There are some wonderful displays over there including from the Chicago Museum. I understand they had a very difficult time transporting their display, which allows you to walk through soil, underground soil. It is spectacular.

Without further ado, I will say that my Congresswoman, Lynn Woolsey, was going to get a very traditional introduction, something along the lines of "She was elected to the House of Representatives in 1992 and re-elected to her fourth term recently. And she represents California's Sixth Congressional District, which includes Marin County and most of Sonoma County."

I happen to have my home in that portion of Sonoma County that is privileged to be represented by Lynn. So I asked permission to do a much more personal introduction. Our paths first crossed about 10 years ago when Lynn was then serving in the city council in Petaluma and I was active with the California Federation of Business and Professional Women.

She brought to that role a very rich breadth, an amazing breadth, of experience as a mother, as someone who had been forced to utilize public assistance programs, and as a small business owner. Lynn also had completed a bachelor's degree in human resources and organizational behavior, a degree that, as I've come to recognize more and more, is probably one of the most valuable ones to have for somebody entering the political arena.

I first knew Lynn as a tireless advocate for affordable child care, equal pay, quality health care, and a variety of family-friendly economic policies.

As I began my own career in public policy development in the natural resources management field, I have found Lynn to be an effective voice and a creative thinker on a variety of land-use and natural resource management issues. I was very privileged to be able to work with her for several years.

However, our nation is fortunate that she brought that energy and sense of service here to Washington, DC. Not only on the issues I've mentioned, but on the issue that has brought us here today, child nutrition.

As you have heard this morning, many studies have shown clearly that when breakfast is provided to children, their attendance, grades, behavior, and emotional development all improve. Lynn has developed a plan to expand the school breakfast program and is fighting to have funding included in the President's budget this year.

To tell us more about that, it is my pleasure to introduce Congresswoman Lynn Woolsey.

Presentation by Congresswoman Lynn Woolsey
U.S. House of Representatives

The School Breakfast Program

Lynn Woolsey, U.S. Congresswoman—There is something really nice about having somebody who knows you introduce you. Thank you, thank you, Glenda. That was so nice.

Thank you all for being in here instead of outside on this beautiful day. It would be easy to be outside. It's gorgeous out there.

As Glenda said, before I became a member of Congress, I raised four children. They are now 32, 35, 36, and 37. They are no longer children agewise, but sometimes I still think they're children.

I'm not a grandmother though, and I'm so jealous of grandparents. I'm so ready to be one. But my children tell me that's none of my business.

But I know when they were young, they were my business. And my most basic responsibilities to them were to raise them with love and to give them direction, to provide shelter and clothing, and to feed them. And if you think the job of a member of Congress is tough, well, try being the mom of four, especially feeding an All-American football player when he was in college.

Throughout his entire youth and years in college, he and his friends would have eaten you out of house and home if you would have allowed it. They did eat a lot. Now they're grown and I serve in Congress.

Children teach parents a lot of lessons. One of the lessons that will remain with me always is that children thrive when they come first. Some people don't get that. They call food and nutrition programs "handouts."

You all remember the fight we had just a few years ago in order to save the school lunch program and to keep nutrition programs from being block granted. The same folks who wanted to do that also think that giving children food at school is a handout.

But we were successful. We had the support of the American public, the American people, because they know the school food programs are a very fundamental part of the education system. They know it's not a handout to provide food for hungry children. They know that a good meal makes a great difference to everybody.

The great bounty of food that our nation and our nation's farmers provide is enough for every person in this country, particularly our children. But now it's time to recognize the importance of a school breakfast program for all children; not just poor children, all children.

In the 105th Congress, I introduced the Meals for Achievement Act. It expands the School Breakfast Program to include all children in elementary levels regardless of their economic status. I was successful in including my bill as a pilot program in the reauthorization of the Child Nutrition Act that was signed into law last year. In fact, I think that was the only real change to the Child Nutrition Act.

This law gives the Secretary of Agriculture the authority to conduct universal school breakfast pilot projects in six districts nationwide. The purpose of these pilots is to study the effect of breakfast at school.

We know that school breakfast has an effect on student achievement, on student behavior, on student well-being, and on the ability of children to learn. So we are certain that this pilot program is going to prove itself and prove that we need breakfast programs for every child in this country at the elementary level.

I would have preferred, of course, to have my original bill enacted, so that we would right now have school breakfast for everybody. But I'm not worried, because I'm sure that once we have the pilot programs, the Meals for Achievements will prove with flying colors that school breakfast provides a very simple and cost-effective means to improve learning.

Yes, the test scores do go up when a child is fed in the morning. And, yes, discipline improves. Minnesota is one of the places that has proven that to us. We've learned that from watching them.

Studies have proven to all of us something we've known all along, that kids who start the day with a good breakfast do better in school. In fact, recently published studies show clearly that students who eat breakfast improve both their grades and their classroom behavior.

We know that the greatest teachers in the very best schools cannot teach a hungry child. And we know that children with growling stomachs simply cannot learn.

School breakfast programs are too often categorized as just another form of welfare. but we know that, in this society, if a person is lucky enough to have two parents, both of them are usually working. That is the norm these days.

That means that breakfast programs are vitally important because working families are commuting. They are leaving the house. They might have food available for their children, but the children don't always sit down and eat it. They want to get on to school.

I've talked to more professional people than you can imagine who say to me, "You know, I would be so glad if I knew my child had had breakfast this morning. It's there, but I don't think they ate it." So we need to look at breakfast programs as a learning tool just as we look at a book, or a pencil, or a computer. Breakfast is a tool. Breakfast ensures that all of our children are ready to learn.

Now, although the Meals for Achievement Act was passed into law, it has yet to be funded. So I gave you the good news. The bad news is, guess what, we have to pay for it.

I'm extremely pleased that President Clinton included $13 billion in his budget for the school breakfast program. But these funds, unfortunately, not too surprisingly, were not included as part of the Republican budget resolution. So we have a hard fight ahead of us.

We want to make sure that there is enough pressure on the people who represent all of us in Congress. All of you will know that this is important so they include it in the appropriations process. I'm going to ask all of you to work with me and work with members across the aisle.

Talk to every member of Congress whom you are aware of and make sure that they include the school pilot breakfast programs in the upcoming appropriations bills because that's the only way we're going to be able to show right away that school breakfast is a tool. It is not a handout.

School breakfast should be a birthright for all children. All children deserve to have enough to eat. When we help to grow a healthy body, we are also developing a healthy mind. Children who are learners become doers. And the doers are the future of the next century. Thank you. Thank you very much for letting me be here today.

Presentation by Mary Begalle
Minnesota Department of Children, Families and Learning

Minnesota Takes the "Fast Break to Learning"

Mary Begalle, Minnesota Department of Children, Families and Learning—Good afternoon. As you can probably tell from the way I talk, I am from Minnesota. And Minnesota is known for its pristine environment, its cold climate; we're the land of 10,000 lakes and the home of this Nation's most talked-about Governor, Jesse Ventura.

Last November, when Jesse Ventura won the gubernatorial election, he declared that Minnesota had shocked the world Well, folks, I have to tell you that next morning when we woke up, I think Minnesota had shocked Minnesota.

But last January, when Governor Ventura rolled out his first ever State budget, child nutrition advocates were very surprised and pleased to learn that this former professional wrestler and one-time radio personality had committed $6 million in his budget to a Fast Break to Learning Program, a universal-style school breakfast program aimed at feeding all elementary children school breakfast at little or no cost in an educational environment that fully integrates nutrition into the school day.

So how is it that this Reform Party fiscal conservative and advocate of personal responsibility would embrace a policy that some folks associate with the decline of parental responsibility and the erosion of family values? Well, simply put, the Governor believes in investing in educational initiatives that work.

Now, we would like to think that our public policy and legislation is based on well-thought-out ideas and well-planned strategies and founded in some of the scientific research that we've heard about this morning. But in reality, is public policy based on philosophy or favors, research or rhetoric, science or spin? I am proposing to you that it is a little bit of all of those things.

When I travel around and talk to folks, as I go to different meetings with different professional associations, folks often come up to me and say, "Gosh, Minnesota is so lucky. Your State is so supportive of school breakfast and you've done so much."

But I have to tell you, it's been a 10-year quest of ours to convince our average person on the street in Minnesota that school breakfast is good education policy.

We started back in 1989 when our hunger advocacy community really rose to the forefront and convinced our Minnesota legislature to pass a school breakfast mandate. That was very much part of a national initiative that the good folks at the Food Research and Action Center were supporting. And it really dramatically increased the number of breakfast sites that we had in the State of Minnesota.

In fact, now breakfast is available in 77 percent of our schools. That's really the good news. The bad news is that only 13 percent of the children in those schools actually participate in the breakfast program.

So it was good in that it increased the availability of school breakfast. But it really didn't do much to convince local decision-makers of the educational value of school breakfast programs. And most decision-makers are folks like the school board, the superintendents, the business managers, the principals, and even the parents who decide whether their children should eat breakfast at school, should have breakfast at home, or maybe not have breakfast at all.

We also learned from that experience that, even though it brought breakfast programs to the forefront, it was viewed by local decision-makers and local school officials as an unfunded mandate. That didn't do much to harness the support of those folks, because they were a little hostile to that.

But going through that process, we did get breakfast out as a political agenda in Minnesota. We also discovered that school breakfast really resonated well with our State legislators. We built on that strength, and we developed some very good partnerships with some very key legislators in Minnesota. We started to have some small successes.

We were able to get State breakfast funding at 5 cents per meal for every breakfast that was served. We then increased that to 10 and a half cents for severe-need schools.

As a result of getting into discussions with our State legislators, the legislature in 1993 directed the State agency, the Department of, then, Education—now it's renamed Children, Families and Learning—to put together a task force to really study the benefits of the school meals program.

So we brought together leaders from all over the State, from all different walks of life: educators, health care professionals, business community leaders, hunger advocates, just a whole array of folks. And, after studying the issue of both school lunch and school breakfast over a period of several months, they came out with an impressive report that we then brought back to the legislature.

That report recommended that Minnesota would do well if they implemented a universal school breakfast program. However, the large price tag scared some of our legislators.

So we decided to use the report and take a really gradual approach to implementing the idea of universal school breakfast in Minnesota. And we convinced our legislature in 1994 to establish a pilot program, four elementary schools that would serve breakfast at no charge, universally, to all children.

We would still participate in the federal program and use that income. But the State made up the entire difference between the cost of the breakfast and the shortfall in funding.

So we got those four sites together. We managed to get a few corporate sponsors. So we added two more sites. We also made sure that there was some money in the funding to do a research project because we knew that the legislature wanted some results from us.

And pilot projects, much of the time, turn into permanent projects. So we wanted to have good information for them. The legislature directed us to study the effects of school breakfast on test scores, attendance, behavior, and any other measure of educational achievement that we could find.

Now, public education in Minnesota is one of the largest items in our State budget. In fact, we spend about $8 billion a year on K-12 education alone. And think of all the education theories that have come and gone, even when we were growing up. There was new math. Then there was not-so-new math. There was phonics and then no phonics. And then we went back to phonics.

So we really wanted to produce some results that would help us to go back to convince the legislature that they should invest in this program.

Other studies up to this point had primarily dealt with low-income children living in inner-city areas; very high-risk areas. So we wanted to focus our study in Minnesota on average kids in average communities in America's heartland.

Our pilots did not focus or concentrate on low-income areas. We had a wide array of demographics in our study. In fact, of our six schools, we had one urban location in Minneapolis, we had two suburban locations, and we had three rural sites. And those rural sites all happened to be out in western Minnesota.

Well, if you know anything about the politics in Minnesota, you know that the twin cities, Minneapolis and St. Paul, tend to be politically liberal. Our suburbs tend to be centrist. In fact, Governor Ventura got a lot of his support from our suburban communities in Minnesota.

You know, they are the folks who want us to be wise with spending tax dollars and they don't want to be paying too many taxes. But they also don't want us to take social security away from mom and dad and they don't want to take food off the lunch trays of kids in school.

And then we had our three rural sites. Those rural sites were out in farming communities, which really are quite conservative areas. So we had a really interesting mix there of both politics and demographics, and a mix of students.

We contracted with the Center for Applied Research and Educational Improvement at the University of Minnesota. We were really pleased to have the university on board with us.

The other thing that I think made our research quite significant is that the legislature committed to funding the project for 3 years. So it's been the longest study that's been done on the effects of school breakfast programs.

The results of the study, as you've heard already this morning, showed some significant improvements in behavior; about 50 percent reduction in referrals to the principal's office for discipline problems; decreased visits to the nurse's office; improvement in test scores; and dramatic increases in participation.

Our schools averaged between 75 and 95 percent participation for 3 years. The State average, as I said earlier, is only 13 percent. So we felt really good about that sustained level of participation.

And we found some other benefits that were surprising. Those of us who had been supporting school breakfast knew we would find information already cited. But one of the surprising outcomes of the research was the social benefits that we found.

We had a lot of principals and teachers comment to us about how the kids got along better, how the kids fit in better at breakfast time. Even some of their students who at other times of the day had problems fitting in at school.

School breakfast provided much more of a family environment. It wasn't like lunch where kids are herded into the cafeteria. At lunchtime, they line up, sit down, eat, and go out. At breakfast time, kids were able to form little ad hoc families. Teachers got to know the kids better and talk to them during breakfast time. A lot of our schools had breakfast right in the classroom.

And even in our very conservative part of the State at those three sites out in rural Minnesota, the parents started to say, "You know what, we think we're having better family time at home in the morning with our kids because we're not arguing with them to sit down at the breakfast table and eat. We're not rushing to make breakfast for them. And some of our kids have such long bus rides, and they have to get up so early in the morning, that it really is better for them and it's better for our family that these kids are eating breakfast at school."

Each year of the study, the university published a report. Here's an example of the first-year report. We were so excited to get the report, we wanted to bring it over to the legislature to share the good news that, gosh, we were right, and this breakfast program really does work.

But we ran into a little bit of a problem because we found that too often, our distinguished members of academe, our health care community, and our health education community end up producing wonderful work that is used to preach to the choir.

The members of the legislature couldn't read this document. They just didn't have the time. And when we tried to share it with other education officials, it just was too overwhelming for them.

So we went back to the drawing board and thought, now this is such good information and such good news, how are we going to get the message across to people in a day and age where no one has time to read, and everyone gets inundated with materials. So we came up with this idea to do an executive summary of our big, thick report. We called this summary, "Energizing the Classroom."

It's an easy-to-read, colorful, upbeat report that gets the message out quickly and in an attractive format. It is easily understood by the person on the street. To date, we have distributed over 180,000 copies of this summary worldwide. I would like to say we've done that thanks to our good industry partners, General Mills, the National Dairy Council, and Schwann's Sales Enterprises.

But this report—putting it in this format and putting this little bit of spin on science—really helped us to get the word out to parents, school administrators, State legislators, members of Congress, and even members of the President's cabinet.

We've used it for multiple hits with the media. Every time during the year that the media has a news story that they want to do on school lunch or school nutrition, we pull our little breakfast summary out of our hip pocket. We make sure we tell them about it. We always manage to get a little positive piece on the news.

Well, the effect of this has been that for the last 3 or 4 years, the folks in Minnesota have heard so much on school breakfast and its benefit on learning that everybody knows it. It's just an accepted fact now.

The challenge that we really face is convincing the local decision-makers. The principals and teachers in our pilot schools have been our best spokespersons. They have gone out with passion and convinced the legislature and convinced other school administrators that this is really the way to go with education.

And with child nutrition programs, a challenge that exists is that we have a top-down federal program that needs to operate in a bottom-up world. Kindergarten to 12th grade education is really a local issue first. At least, it is in Minnesota, and I think it is in other parts of the country, too. Then next, it's a State issue.

So if we really want to get school nutrition programs to be recognized not as a welfare program, not as a feeding program, but as an education program, then we need to get that support at the grassroots level. In Minnesota, we think that we're just starting to be recognized as part of education.

I was so pleased when Governor Ventura's budget was introduced into the Minnesota Senate and our new Commissioner, Christine Jax, presented the Governor's education budget before the K-12 Finance Committee. She gave a brief overview of the budget to them.

She mentioned a few major education initiatives of the Governor's. One was that the Governor wants to reduce class size. And another, the Governor supports school breakfast programs. He had put a lot of extra money into his education budget.

When asked by some of the more conservative senators on the committee, "Shouldn't parents be feeding kids breakfast, and why is the Governor supporting and putting so much money behind the School Breakfast Program?" she said, "Well, the Governor is interested in education initiatives that work." And I felt we have arrived.

I've been in school nutrition for almost 20 years. And we've been trying to tell folks that we are an education program. And I sat in the gallery thinking they get it. They get it. I guess we've gotten the word across.

We currently have 41 elementary schools that offer universal school breakfast programs. And these are not Provision 2 and Provision 3 schools. After our 3-year study, our legislature did appropriate a million dollars to fund more sites than the six original pilot sites.

But they did something different with the program. They called it a targeted breakfast program. It's available to schools that have 33 percent or higher children who are eligible for free and reduced price meals. They also made it a grant, not a per meal reimbursement program. The grant requires a local match from the local school to participate in the program.

For every $3 in State aid that is given to the school, the school has to raise a $1 match. Now, under our current targeted breakfast program, that money cannot come from charging children. It has to come from other sources.

Our schools have been very creative in going out and getting grants from local businesses. They can also use in-kind contributions. They can get product donated from food companies, all kinds of different ideas. And those schools are reporting back very, very high participation rates in the breakfast program.

This program is a partnership because it's a true collaboration of local, State, and Federal efforts. And that's a model that really works well because each arm of government is committed. They step up to the plate and they participate in the success of the program. So it has been a very successful format for us.

Our Governor's proposal—his proposal is named the Fast Break to Learning—is very similar to our current targeted breakfast program.

If it passes, we will have enough funding to have a universal-style breakfast program in 38 percent of our elementary schools statewide.

We have a real political experiment going on in Minnesota. We have a tripartisan government. We have a Republican-controlled House, a Democratic-controlled Senate, and a Reform Party Governor. Our Republican-controlled House, which is quite conservative, just last week passed their omnibus K-12 education bill, and it did include the Governor's recommendation for the $6 million for Fast Break to Learning.

And I have to give credit to our Under Secretary, Shirley Watkins, who visited our State about a month ago and came to one of our breakfast sites and met the Chair of our K-12 Education Committee in the House, Republican Representative Alice Segran. Let me tell you folks, she is a believer now.

So we're very excited. The bill is being debated in the Senate. The talk in the corridors at the Capitol is that they may put even more than the $6 million requested in the Governor's bill into their bill. We still have to go to conference committee and we still have to have the bill signed into law by our Governor.

But I think in Minnesota we took a little bit of good philosophy, a few favors along the way, sound research with some political rhetoric, and science with a little bit of spin to put Minnesota well along the way to taking a fast break to learning. Thank you.

Presentation by Lynn Parker
Food Research and Action Center

Breakfast at School: What We've Learned and Where We Go From Here

Lynn Parker, Food Research and Action Center—I'm going to continue Mary's optimistic approach and Representative Woolsey's optimistic approach. We're the happy team today; not only because it's beautiful weather outside, but because we have a wonderful program that's reaching many kids across this country. And we have a great future ahead of us in terms of expanding that program. That's what I want to talk about to end off this symposium.

I'm one who always sees the glass half full rather than half empty. But with breakfast, it's even easier to do that because I've been in Washington over 20 years now working on child nutrition programs including the breakfast program. When I look back to the time when I first started working at FRAC, when we were working on trying to expand the breakfast program, and then when I look at where we are today, I can't help but feel pleased and optimistic for the future.

When we look at the breakfast program now, we see that 70 percent of our schools have breakfast programs. And we see nationwide that over 40 percent of children who are receiving free and reduced-priced lunches are also getting free and reduced-priced breakfast.

That's quite an achievement! And it's an achievement that was won with many difficult battles on the way. In talking to you today, I wanted to spend half my time talking about the past and the rich history of the breakfast program and then spend the rest of the time talking about the future.

I think it's important to know where we've come from with breakfast, why the program started, what some of the earlier battles were, what we've won, and what we've battled to maintain with breakfast, so that as we go forward in the future to expand the program and do creative things with the program, we remember some of the most important things about the breakfast program that we need to preserve.

Breakfast was started as a pilot program in 1966 under the leadership of Carl Perkins who, as many of you may remember, was a wonderful congressman from Kentucky, a real advocate for children. He put into the legislation for school breakfast back in 1966 that it should go to schools in communities that have poor economic conditions, to schools where there are children from low income families, and to schools where children had to travel long distances.

He was worried about those kids in Kentucky who got up early, had a breakfast, worked in the fields with their parents, and then got onto a school bus and went to school. And by that time, they were pretty hungry.

Also, he put in the legislation that the breakfast program should go to schools where there was a special need to improve the nutrition of children of working mothers. Carl Perkins was talking about supporting working mothers in 1966. Some of us are still working on getting people to talk about that in 1999.

So the program started out as trying to solve the kinds of problems that we've been talking about today and to reach kids in the ways that we've been talking about, and it has succeeded in many ways, as we've heard.

The program was made permanent in 1975. It carried on the key characteristics of the lunch program that are so important. For example, there is a national nutrition standard for breakfast. The breakfast program is supposed to meet one-fourth of children's nutritional needs.

It is required to have fruits and vegetables and grains and dairy products. And schools are working to reduce fat in the program. So the program is not just a hunger abatement program. It is also a nutrition program with national nutrition guidelines.

Another thing the breakfast program has is income guidelines so that children who are poor can get a free breakfast or a reduced-priced breakfast. In addition, all schools in this country that are public and private nonprofit can participate in the program. It's not limited to any particular kind of schools.

It's an entitlement program. And that's probably the most important word here. Every child in this country who is in a school that has a breakfast program can participate in that program. Every school in this country that wants to feed children breakfast in the morning can participate.

That's so crucial because if we weren't able to extend that entitlement, we would have continuing battles in Congress and in State legislatures about whether we had enough money to feed these kids. We know now that every year we can feed as many kids as need this breakfast program. That's a very important element of the program.

School breakfast has been traditionally geared to low income communities and to low income kids. And about 86 percent of the kids who are participating in the program right now are poor children. But, as we've been discussing today, we are seeing that there are needs that are much broader than just among the lowest income kids in this country.

I wanted to talk a little bit about the first battles we had with breakfast. When the breakfast program first started out in 1966 and when it was made permanent in 1975, it wasn't enough to have a law, as Mary knows.

We had to go out into the communities—working with antihunger advocates, pediatricians, social workers, parents, and school food service employees who were running the lunch program. We had to talk about why there should be a breakfast program in each community we were trying to reach.

And we had a lot of resistance. People were worried about bus schedules. They were worried about whether the facilities were adequate. They were worried about staffing. They said they didn't have a cafeteria. They said there wasn't enough money to serve breakfast. They said home was the place to have breakfast, as we've heard here, not schools.

They said, "Our community doesn't need a breakfast program. We don't have any poor families here. We don't have any poor children here. We don't need a breakfast program."

But we worked hard and long and we see today that all our efforts and the many efforts of you here in this room have succeeded in expanding the availability of the School Breakfast Program.

Another method that we tried that was quite successful was what Mary talked about, the mandate idea—requiring some or all schools in a State to provide school breakfast.

That idea caught on originally with West Virginia. The State of West Virginia passed legislation saying that every school should have a breakfast program. Then Texas came through saying that schools that have more than 10 percent of kids receiving free and reduced-priced meals should have a breakfast program. And so it began to build.

More and more advocates and parents and people concerned about kids across the country thought, well, let's let's try to do something statewide.

What we have today is 23 States that have some form of a mandate, varying from the West Virginia model all the way to Connecticut, which kicks in at 80 percent free and reduced-price participation.

We tried to pass a school breakfast mandate on a national level, as well. In 1978, there was a strong attempt to create a national mandate, saying that any school in this country that had more than 40 percent children receiving free and reduced-priced breakfasts should have to participate in the breakfast program. But we confronted at the national level the kind of resistance that we had seen at the local level when we tried to get that through, so we were unsuccessful.

But I think the whole process of going through that, of talking about it throughout the country, really helped to move the breakfast program forward and to create and disseminate the idea of doing mandates State by State.

Meanwhile, a lot of other things were going on to help move breakfast forward; for example, the kinds of research that we discussed this morning.

Dr. Pollitt is one of the early heroes in the research area because he was the person who in 1978 looked at all the research that had been done up to that time, which varied all over the map; some showing that there was an impact of breakfast, some showing that there was not, because it is such a difficult thing to study. He wrote an article that was published in the American Journal of Public Health saying that, yes, after reviewing all of the literature, the breakfast program did make a difference for kids. Being able to quote Dr. Pollitt at that time helped a great deal in expanding the breakfast program. He also did some of the laboratory experiments he talked about where he looked at both middle class and low income kids and saw the impact of breakfast in a very controlled setting.

And then of course, Alan Meyers from Massachusetts did the famous Lawrence, Massachusetts, study with third to sixth graders. He was the first one to show the impact of breakfast on achievement test scores and on tardiness and absenteeism. Those early studies then led on to the kinds of research that we heard about this morning.

The Department of Agriculture also did some important research on breakfast. The national evaluation of the breakfast program that was published in 1983, and then the following one 10 years later in 1993, both looked at the breakfast program, and both had important things to say about it.

Many of you may not remember, but, back in 1983, the report said that the breakfast program was doing well in many nutrients compared to breakfast at home, but it was lacking in iron, vitamin B6 and vitamin A. As a result of that study, Congress appropriated more funds for the breakfast program.

We got 6 more cents for each breakfast that was served so that the meal pattern for the breakfast program could be improved. And that's why we have that extra serving of grains or a meat alternate in the breakfast program now.

The second study that the Department did 10 years later found, interestingly enough, that breakfast was now reaching one-fourth of the Recommended Dietary Allowances for kids; and that the presence of a breakfast program at school made a significant difference in whether kids ate breakfast at all.

There were legislative changes and challenges over the years. The year 1981 was one of the challenges. The breakfast program was cut significantly—to the point that the number of schools offering breakfast went down and the number of kids who participated in school breakfast also decreased.

In 1996, there was another great challenge. That was the legislative battle over whether child nutrition programs should be made into block grants. The whole concept of national nutrition guidelines was threatened during this period, as well as the concept of entitlements in child nutrition programs and the ability to expand the programs when need increased. But the block grant battle was won in favor of school breakfast and the other child nutrition programs.

There were two other positive things that happened for breakfast that are important to know about. There is something called a severe-need reimbursement, 20 cents more per breakfast nationally for school districts that are very poor and don't have the tax base to support all the labor and so forth that's connected with the breakfast program.

And also, for quite a while, from 1989 until fairly recently, we had startup funds to help States expand the breakfast program.

Another wonderful thing that happened during this period was that the education community showed growing support for the School Breakfast Program. They started to talk about how breakfast was important to all kids; how it was and should be like books, like physical education, like music; that breakfast is a key part of the school day, as people have been discussing today.

That wasn't, as I said, always the case. Some of the principals and superintendents in the past weren't as supportive as they've come to be in recent years, in part because they've seen how

the breakfast program works and because they've heard about some of the research that we've heard about today.

So where do we go from here? Obviously, we've got to get the breakfast program into every school in this country. School lunch is in virtually every school in this country, and I think we can make that happen with breakfast, as well. It just makes sense. It makes sense in terms of everything we've heard today; that kids need it for nutrition, that they need it for learning. Parents need it for support when they're working. But of course we have to work hard to achieve this expansion of the School Breakfast Program.

I would be remiss if I didn't point out that for many families, school breakfast is essential. These are the families who are food-insecure, who go from day to day not knowing where their next meal is coming from. We know that that there are a large number of families in this country who find themselves in this very difficult situation, based on USDA's research with the Census Bureau using their food security measure. We also know it from the food banks that are reporting through the Second Harvest National Survey that about a third of the people who are showing up at food banks represent children, many of them children from working families.

We know from the Urban Institute that about half the kids in low income families are suffering from some form of food insecurity, whether it's the family not knowing where the next meal is coming from, or whether it's that adults have had to cut back or kids have had to cut back on what they're eating.

Because we know that the breakfast program can be very important for these families, we need to work hard to make the program as widely available as we can. But it's not just a matter of putting it in the schools. It's also making families aware of the program. It's making families aware that there are free and reduced-priced meals so that they know that they don't have to pay the full cost of the meal if they can't afford it.

We also have to deal with the issue of stigma. Because breakfast has been targeted to low income schools and children, some children associate school breakfast participation with being labeled "poor" in a negative way.

Part of the solution to the problem is to create a new image for the program—that it is for all kids who want to participate. There are two provisions in the school breakfast statute, called Provisions 2 and 3, that allow schools to collect applications for free and reduced-priced meals for 1 year and then go for 3 more years without collecting applications, and at the same time offer free meals to all children.

It's a form of universal school breakfast, and it's available to schools across the country. It works out best for schools that have higher numbers of poor kids because what happens is that if they collect those applications that first year, and then don't have to collect them for the next 3 years, they don't have to pay for the paperwork costs of collecting yearly applications. They can put the paperwork savings into the breakfast program in order to pay for any costs that aren't covered by federal reimbursements.

A method of school breakfast outreach that is still not used enough is "direct certification." Under direct certification, any child whose family is eligible for food stamps or the Temporary Assistance for Needy Families (TANF) program is automatically eligible for school breakfast. Schools can cross-tabulate their enrollment in school with the social service office's food stamp enrollment list, find out which kids are eligible, and provide automatic eligibility for school breakfast so that they don't even have to deal with the application process.

It has been said many times today, but I'll say it again—it is very important that we get the funding for those universal breakfast pilot research projects. This study has the potential to make an enormous difference for us. Finding out the answers about what the impact of universal breakfast is, using the kind of research that policymakers will respect and listen to, is essential.

There are all sorts of other wonderful things that we can do with the breakfast program. For example, we can improve the atmosphere in which it's served so that it's much more fun for kids to be there. We can put more people into the breakfast program so that kids aren't just picking up cereal boxes off of the counter, but they're interacting with teachers, with school food service people who care about them.

We can make sure that new schools have cafeterias. Many new school buildings are being built without them. We have to fight to get cafeterias. We also need to include students in the operation of the breakfast program and include their ideas, include what they would like to see.

And we have to include parents in the breakfast programs: getting mothers to come to the breakfast program once a month, serving them coffee, getting them in the cafeteria so that they can feel more comfortable in the rest of the school.

We need to get more middle and secondary schools interested in breakfast. That will involve dealing with the stigma issue. But it's also doing something like putting the breakfast in a brown bag so that they can go outside and sit in the grass and eat the breakfast or go into the computer lab or wherever it is that kids like to gather and eat, taking that brown bag with them.

We also need to think about nutrition education, as people have said, with school breakfast, and we have to think about mentoring, even with school breakfast: bringing in those breakfast buddies, those retired individuals, senior citizens, those businesses that are nearby—having their employees stop by at the breakfast program, sit with kids, talk with them, and read with them.

There are many opportunities to make breakfast more than hunger abatement—make it more than even nutrition—and turn it into the socialization program, the program where communities can get together, where people can get together with kids in an informal and pleasant setting.

All of that requires a big change in the way we look at food in school. One of the biggest challenges is to change from the "filling station" approach to the food, nutrition, social-development approach. And that's something that we really need to work hard on, with many of the principals and superintendents across this country, to get them to see food and nutrition in a totally different light.

We all need to press forward, as a united group of educators, antihunger advocates, and health professionals, to expand and improve the breakfast program. We also have to maintain eternal vigilance so that nobody trips us up with another set of cuts or another set of block grants in the future. I think that we can all move forward optimistically and purposefully with the information we have received at this symposium. Thank you.

POLICY IMPLICATIONS QUESTION-AND-ANSWER SESSION

DR. ANAND: Thank you very much, Congresswoman Lynn Woolsey. Thank you, Mary Begalle and Lynn Parker for exciting presentations. And before I invite your comments and questions, I would like to acknowledge the great help in organizing this symposium of my staff, John Webster, Nancy Gaston, and Andy Fitzgerald; from the FNS staff, Mike Haga's group; and Donna Buntrock.

Now the floor is open for you to ask any question or make any comments. I would like to start with a question for Mary Begalle. How much money are we talking about if all schools in Minnesota were able to offer the school breakfast program?

MS. BEGALLE: For our elementary schools, it would take $20 million per year for a complete universal program.

DR. ANAND: Go ahead, please. Identify yourself.

QUESTIONER (from Syracuse University): My question is for Mary. You mentioned that the schools had to raise some matching funds to fund the School Breakfast Program, and they found some creative ways to do it. In central New York, some of our high schools have been signing pouring rights contracts with the soda companies to fund some of their programs.

So I was just wondering if you could share any of the creative funding ideas and what kind of strange bedfellows might be involved.

MS. BEGALLE: Well, we haven't seen any pouring rights contracts supporting school breakfast. Most of the ideas have been soliciting funds from area businesses who are interested in helping the schools. Some corporations in Minnesota have programs that, if you buy from their store, they'll donate to your local school, that type of thing.

Plus, we were quite creative in telling schools that they could use in-kind contributions. So if they could entice parents to come and spend time at school volunteering in the morning, they could cost out the amount of time that the parents spent at the school at a teacher's aide rate and use that as an in-kind contribution.

I can tell you, we have had one interesting proposal at our legislature to use a vending machine sales tax to pay for school breakfast. That didn't get very far. But maybe that's not such a bad idea.

DR. ANAND: Go ahead.

QUESTIONER (from the Center on Hunger and Poverty): Hi. I have two comments and a question. The first is more of an informative comment spinning off of the whole push for universal school breakfast.

We just put out a guide for running universal school breakfast programs. I did have a few reports here available that went quickly. So whoever got them is lucky. If you didn't, you can

always call the Center. But we addressed some of the issues and the benefits in providing the School Breakfast Program, as we've all heard here today.

My other comment is regarding direct certification. One of the concerns that I have been hearing is how welfare reform is going to affect direct certification, because then less children will be direct certified.

Now, these families who lost, say, their food stamps benefits, would also lose the direct certification benefit. So that's my question for you, Lynn.

The other question is similar. Title I funding, which I understand was formerly tied into the application process for school meals, I heard recently will now be tied into the census of the local area. Mary, you've got comments on that one, I can tell.

My question is whether doing that with school breakfast would make it easier for everyone, for all families, so that we're not doing applications at all.

MS. PARKER: Well, you're right about the direct certification. Because fewer families will be eligible for TANF than were for AFDC, which was the original categorical connection, that means fewer families being certified directly.

Also, because we've seen reductions in the food stamp rolls, not necessarily because people are not eligible, but because people think they're not eligible or because, in some cases, they've been misled to think that they're not eligible, there are fewer kids who will be directly certified because of that.

However, there are still many people in this country who are on the Food Stamp Program. We're hoping— and I know the Department of Agriculture is hoping also, because they've set up a toll-free number for people with questions about the Food Stamp Program—that more of those families who need it and who are eligible will come back to the Food Stamp Program so that more kids get the food they need and also can be directly certified for the child nutrition programs.

The situation you point out just shows how important it is to find other ways of getting the word out to families that the breakfast program is there for them and that they can get free and reduced-priced breakfasts for their children.

DR. ANAND: At this time, our Under Secretary has to leave and take a flight to go to Chicago. It is my sincere belief that without her vision and without her passion and without her support, we could not have done this thing. So please welcome our Under Secretary, Shirley Watkins, who has great tolerance for our shortcomings.

(Under Secretary Watkins' statement follows the questions and answers.)

DR. ANAND: Are there some other comments or questions? This is your chance to really get back at us. Go ahead.

QUESTIONER (with the USDA Food and Nutrition Service): Hi. We've had a lot of mention made today of the $13 million that I think we are all hoping Congress will appropriate for doing the breakfast research pilot. My office, the Office of Analysis, Nutrition and Evaluation, is hoping that money will come through so that we can do this study.

But we are at this point starting to invest in the design work. If anybody has any interest in having input into that, we would be more than happy to hear from you. Please see me after the session here and we would be happy to provide you a phone number or e-mail.

DR. ANAND: Very good. Any other comments or questions? Well, if not, I want to thank each one of you for coming here and patiently listening to all this symposium. Watch your web site for the next symposium in June. Thank you very much and thanks to the speakers and thank you all.

(Whereupon, the symposium was concluded.)

CLOSING REMARKS

Shirley Watkins, Under Secretary for Food, Nutrition, and Consumer Services—I want to thank all of you for being here with us today. this has been an incredible experience with enormous information even though we still have a long way to go, as evidenced by some of the researchers this morning saying that we need more research.

Obviously, we're optimistic that we will get the $13 million with all of our work and all of your work and all of the people who are not here who will be working around the country to help us realize the goal of getting the research and in getting some of the things done that you think need to be done.

There are a lot of questions that need to be answered. I think that's why we got so many questions when we proposed this last year as a part of reauthorization. Given the concern that people have, and given the concern that we know is out there, if we can answer the questions that many of you have and many of the Congressional delegates, as well as State legislators and school boards and principals have, I think we will do well to get this research under our belts.

One way was to raise the issue in the form of a symposium. We did that today. We raised a lot more questions maybe than we have answers for, and I think we will be able to get those answers if we get the research.

As we move into the new millennium, we have to realize that these programs are nutrition programs and a part of the educational process. It's a part of the educational day. And as long as they are health-related, a part of the educational day, I think that's how all of our programs are going to survive in the new millennium.

I want to thank each one of you for coming. I've seen people here from all over the country, people in the health care field, people in education, people in the advocacy community, people from a variety of USDA agencies, people from the Department of Education. We all have a common goal, and that's to make certain that we're doing the best for our children in this country so that they can be the best that they can be.

We did videotape today's conference. And Raj will find out if there is a cost. If some of you are interested in having copies of the videotape, we will make those available. I'm sure it will be a nominal cost--as you all look at me and say, "Well, gosh, she never said that when we started"--but I know that many of you would like to have this information to take back to your communities.

So we will put that information on the Internet on our web site and make that available to you. Dorothy Caldwell is interested in making certain that we have some of the speeches on the Internet tomorrow. Now, Dorothy and I like everything to happen tomorrow. So since they are not going to be here tomorrow, Dorothy, maybe we can get it done on Monday.

Again, I want to thank all of you for being here. And you may have additional questions. I hate to have to run out of here. I'm afraid if I don't, I might get stopped by all of the traffic. I have

a 5:00 p.m. flight to catch, and I've been accused of not getting to the airport on time. I have to go to Chicago and do an obesity symposium tomorrow and work on a breakfast issue on Saturday.

I look forward to hearing from all of you with your comments and suggestions. I would encourage you to go to our USDA web site to find out more information about the forum that will be coming up in June.

I think you will find that very intriguing and we will have a lot of interesting speakers to talk about the healthy school environment and what that means for children. This should be a very provocative session, perhaps more provocative than the obesity prevention and the breakfast symposium.

So look for that. And let's come back together and talk about how we can make things better for children in this country. Again, thank you so much for being here with us. We appreciate you and look forward to working with you as we move forward in this venture together.

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